Appendix H

Conceptual Engineering Analysis

Appendix H contains a summary report of the Conceptual Engineering Analysis of expressway and viaduct options, performed by Jacobs Civil, Inc., used in support of the US 95 Coeur d'Alene Corridor Plan.

Appendix H also includes a special report prepared by ITD titled – "Overview of Maintenance Concerns" for that section of the corridor study along US 95 from the Spokane River to Ohio Match Road.

Conceptual Engineering Analysis of Expressway and Viaduct Options

A number of study participants questioned the viability of some of the possible improvement options defined earlier in the US 95 Coeur d'Alene Corridor Plan process, most notably the (1) four-lane expressway with parallel frontage roads, (2) the I-90 flyover ramps as part of the US 95 Expressway options, and (3) possibility of fitting the Ironwood segment with a viaduct, if and when needed. To address these concerns, the planning-level analysis was expanded to include added conceptual engineering. The conceptual engineering analysis examined the opportunities and constraints of possible improvement options along US 95 within the Coeur d'Alene and Hayden urban area (between the Spokane River and SH-53). The analysis focused on three parts or segments: (1) US 95 Expressway with Frontage Roads (north of Appleway); (2) US 95 / I-90 Interchange; and (3) the "Ironwood" segment of US 95 located between I-90 and the Spokane River.

PART 1: US 95 Expressway with Frontage Roads

Between Appleway and SH-53 the State of Idaho presently owns about 220 feet of right-of-way along the current US 95 alignment. Previous planning analysis identified a number of expressway options that might fit within the existing right-of-way, including the addition of directional frontage roads to provide local access and circulation, and varying types of interchange concepts. The conceptual engineering analysis mapped each of these options in more detail, and examined the various advantages and disadvantages of each regarding arterial traffic operations and control requirements, pedestrian and bicycle access and circulation, structural requirements, and state highway maintenance operations. The interchange options include slip ramps with frontage roads, single-point urban interchanges with frontage roads, roundabout interchanges with frontage roads, and diamond interchanges without frontage roads. **Exhibit H-1** illustrates the various interchange options and summarizes the advantages and disadvantages of each.

The findings of the analysis shows that each expressway design option will fit within the existing US 95 right-of-way and that the frontage road options provided the best local traffic access and circulation.

Slip Ramp Interchange

The major disadvantage of the slip ramp interchange concept is that it may be a little more difficult to coordinate the arterial/frontage road intersection traffic signals. By all other measures, however, it was found to be the best of the three frontage road options because the concept design is likely:

- Easier for the State to maintain, especially removing snow during the winter months;
- More friendly to bicyclists and pedestrians;
- A more familiar design treatment for local motorists;
- Cheaper because it does not require as much retaining wall structural support along the frontage roads; and
- More efficient in accommodating expressway traffic operations between major interchanges by minimizing traffic weave and merge conflicts.

Further examination of the expressway options focused on the ability to transition the slip ramps and provide adequate design of local street intersections to the frontage road. **Exhibit H-2** illustrates a plan overview of the US 95 expressway option with frontage roads and slip ramps between Hanley Avenue and Canfield Avenue. **Exhibit H-3** provides an oblique view of the same concept.

PART 2: US 95/I-90 Interchange

The planning analysis identified the possibility of directional, flyover ramps between I-90 and US 95 to help reduce the future travel demand traveling through the US 95 intersections at Appleway and the I-90 westbound and eastbound ramp intersections. In turn, these enhancements would free up capacity on US 95 for more through and local traffic to and from Appleway. The conceptual engineering analysis mapped and examined two flyover ramp design options based on varying design speeds, plus a third option that could integrate a possible viaduct option along US 95 south of I-90.

Exhibit H-4 illustrates the three enhancement concepts for the US 95/I-90 interchange area. Of the two flyover ramp options, the 45 mile per hour (mph) design speed option would require additional right-of-way to accommodate the new I-90 eastbound off-ramp (to US 95 northbound). The partial cloverleaf interchange option could accommodate the possibility of fitting US 95 with a viaduct between I-90 and the Spokane River, but would require additional right-of way on the south side of I-90 and displace the waterslide facility. The purpose of the viaduct would be to separate the US 95 through traffic from local traffic, when warranted by growth in traffic on and between US 95, I-90, Appleway, and Ironwood Boulevard (see discussion below).

All three options could generally accommodate the replacement and/or widening of the US 95 bridge over I-90 to fit additional travel lanes (through and/or left turn lanes) to better manage traffic on US 95. However, each of these options would result in obscuring some of the I-90 (motorist) sight lines to existing businesses, resulting in the need for additional advanced signing on I-90, particularly in the westbound direction at a location east of US 95.

PART 3: "Ironwood" Segment

Observation of the current and projected area land uses and traffic conditions within the Ironwood segment reveals a generally inadequate local arterial street network and principal reliance on Ironwood Boulevard for much of the east-west travel to and across US 95 in the immediate area. The conceptual engineering analysis provided additional findings to help answer questions raised by study participants during previous public open house meetings and in the subarea group meetings held in the Summer, 2001. These questions are:

- Is the current width of US 95 adequate to install channellized left- and U-turn lanes?
- What local arterial street improvements are needed to support US 95 and the surrounding land uses?
- Can US 95 be fitted with a viaduct to address statewide access management standards for a four-lane, principal arterial through the Ironwood segment area?
- How would a US 95 viaduct in the Ironwood segment fit with the I-90 and Northwest Boulevard interchanges?
- What would the general "footprint" of a viaduct along US 95 look like within the Ironwood segment?
- Is the viaduct needed for acceptable traffic operations within the next 20 years, or can other, less extensive, solutions provide adequate capacity to meet the growth in traffic?

The existing right-of-way along US 95 between Ironwood Drive and Walnut Avenue ranges from 80 to 95 feet. There are presently two travel lanes in each direction with a center, left turn lane on US 95. Adjacent lands include a range of commercial, medical business, general business, and residential uses. Many of the more recent buildings were constructed very near the existing curb and sidewalk facilities.

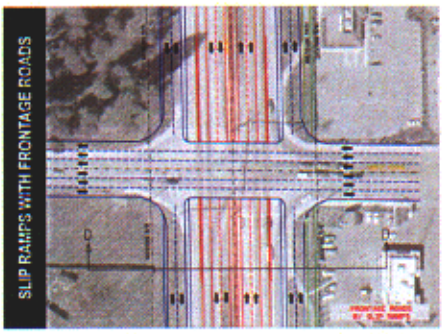
Coeur d'Alene / Hayden Segment
US 95 Expressway Interchange Options

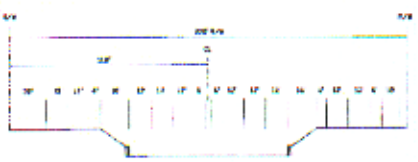
Exhibit H-1

Idaho Transportation Department

PLAN VIEW | **PROFILE VIEW**

SLIP RAMPS WITH FRONTAGE ROADS



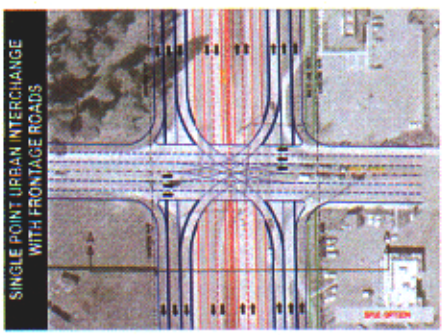


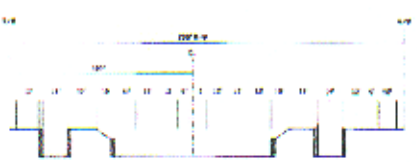
TYPICAL D-D
FRONTAGE ROADS
W/ SLIP RAMPS

Pros:
- Similar configuration of traditional "Diamond" interchanges
- Continuous frontage road system provides good, local access and circulation
- Provides best pedestrian safety and accomodation

Cons:
- Traffic signals likely required at each frontage road intersection with major cross streets
- Distance between traffic signals on the cross street (150') may require rigorous traffic signal system control

SINGLE POINT URBAN INTERCHANGE WITH FRONTAGE ROADS



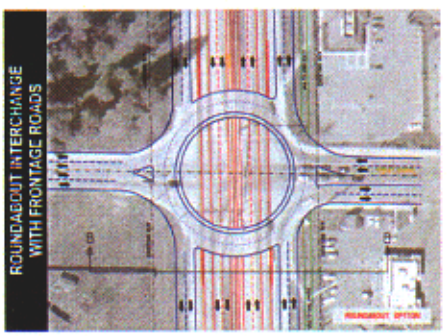


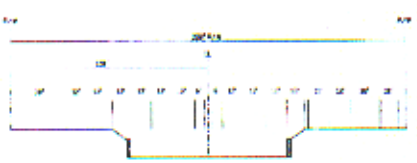
TYPICAL SECTION A-A
SPUI OPTION

Pros:
-Requires only one traffic signal for each interchange
-Provides good traffic circulation and operation

Cons:
- Requires significant retaining walls along frontage roads (higher construction costs)
- Difficult to remove snow and maintain highway and frontage road system
- Distances between interchanges makes it difficult to accommodate the traffic weaving between US 95 and the frontage roads
- Requires moving the centerline of US 95 to accommodate design in existing right-of-way
- Design can be pedestrian- and bicycle- "unfriendly"

ROUNDABOUT INTERCHANGE WITH FRONTAGE ROADS



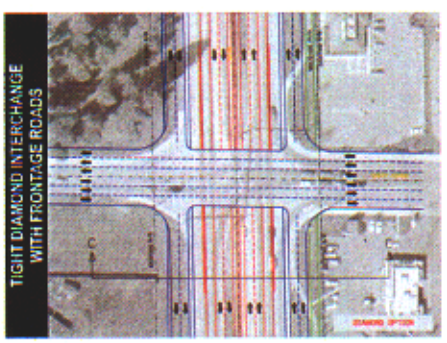


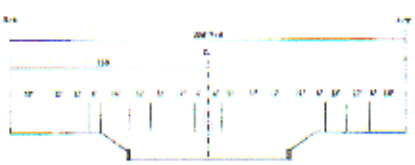
TYPICAL SECTION B-B
ROUNDABOUT OPTION

Pros:
- No signalization required on major side street interchange connections
- Design may provide new and unique design to community infrastructure
- Continuous frontage road system provides good, local access and circulation

Cons:
-Interchange design and concept (on arterial-to-arterial connections) is foreign to local travels may require significant adjustment and acceptance in the local community
-Design can be pedestrian- and bicycle- "unfriendly"

TIGHT DIAMOND INTERCHANGE WITH FRONTAGE ROADS





TYPICAL C-C
DIAMOND OPTION

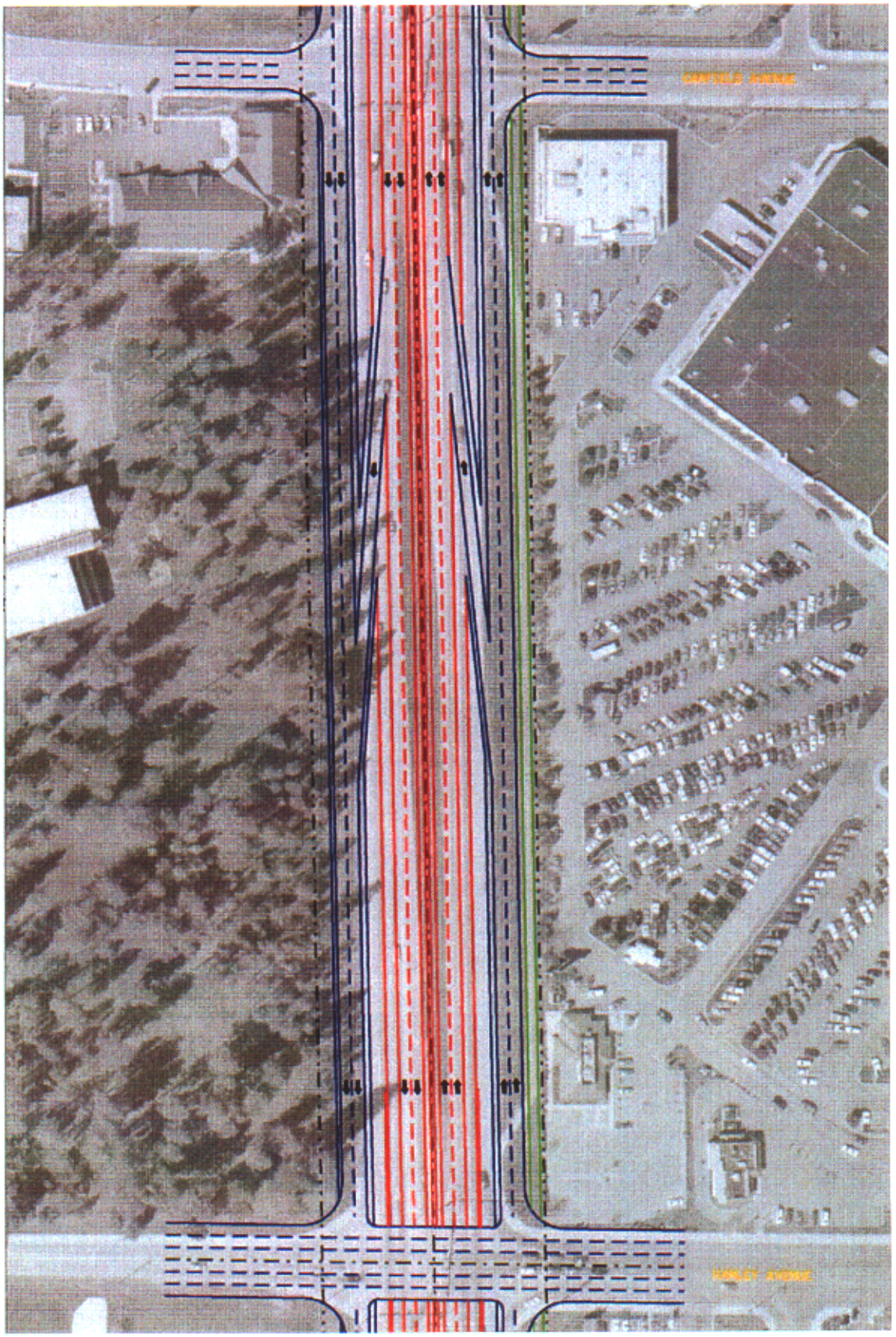
Pros:
- Traditional interchange concept

Cons:
- Signals required at each on/off ramp location (two locations)
- Minimum distance from signal to signal along cross street (150')
- Potential queuing problems for left turn movements from cross street to on ramps
- Lack of frontage roads eliminates adjacent business access

US 95 Expressway Option with Frontage Roads at Hanley Avenue - Plan View

Exhibit H-2

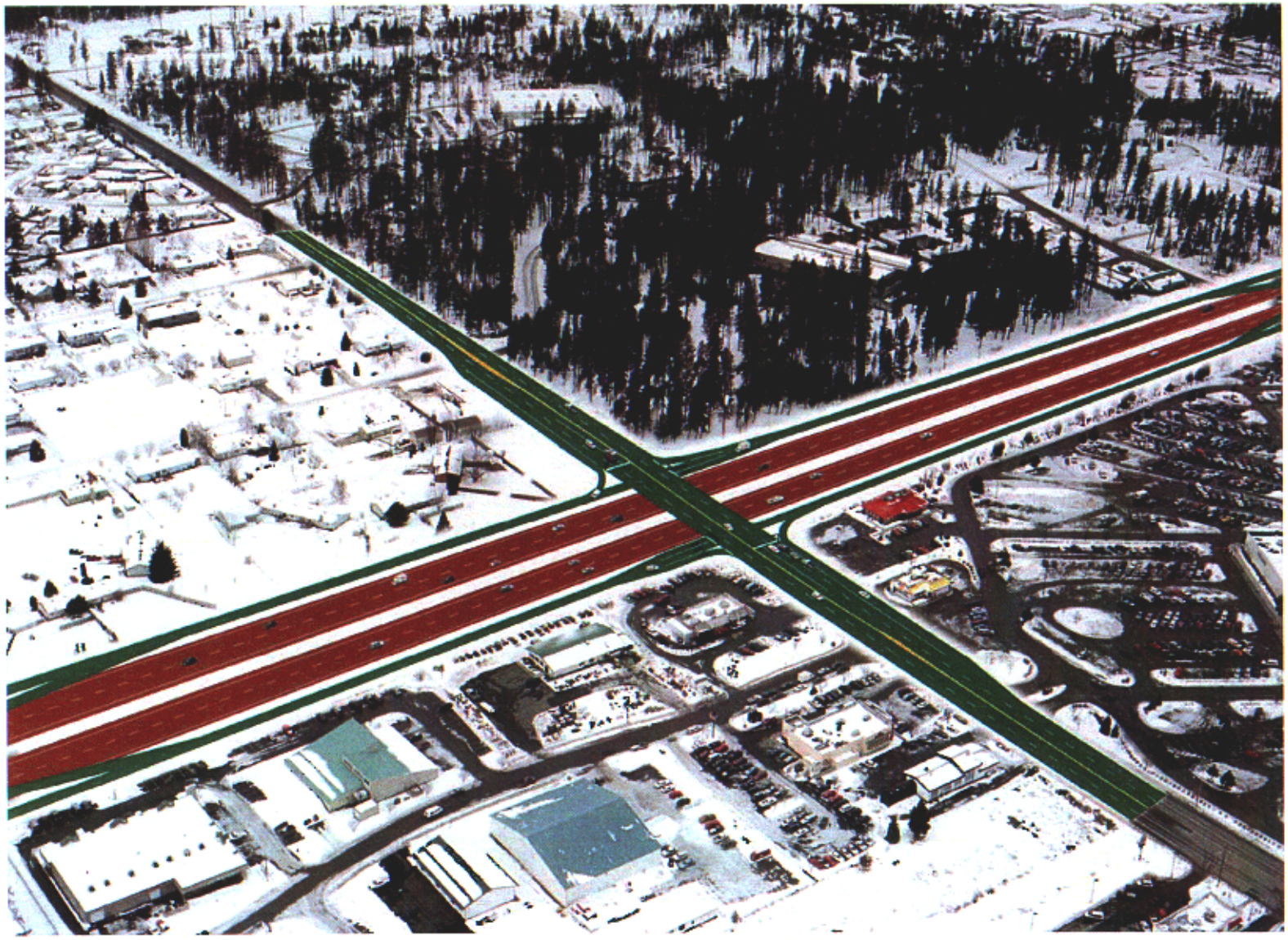
DISTRICT 1
Idaho Transportation Department



US 95 Expressway Option with Frontage Roads at Hanley Avenue

Exhibit H-3

DISTRICT 1
Idaho Transportation Department



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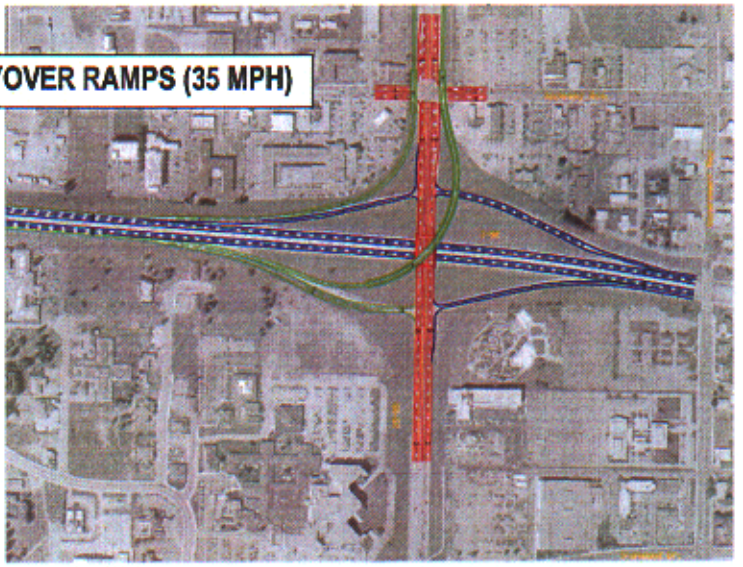
Coeur d'Alene / Hayden Segment: I-90 / US 95 Interchange Options

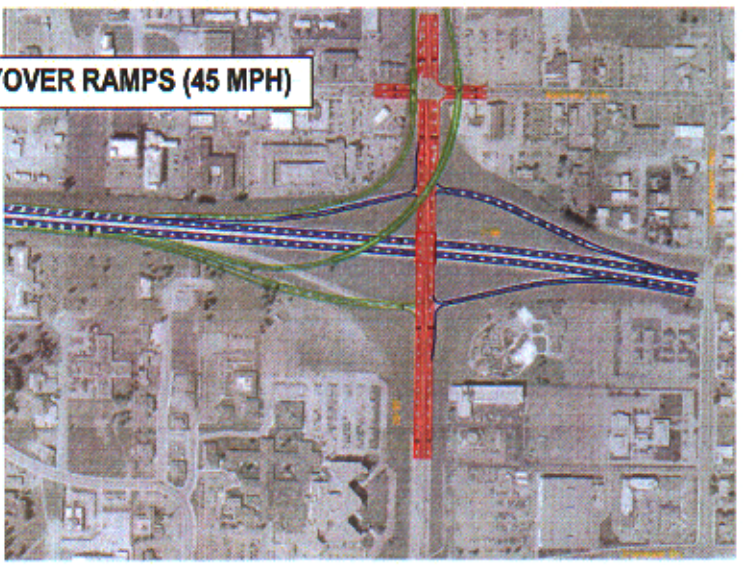
Exhibit H-4

DISTRICT 1
Idaho Transportation Department

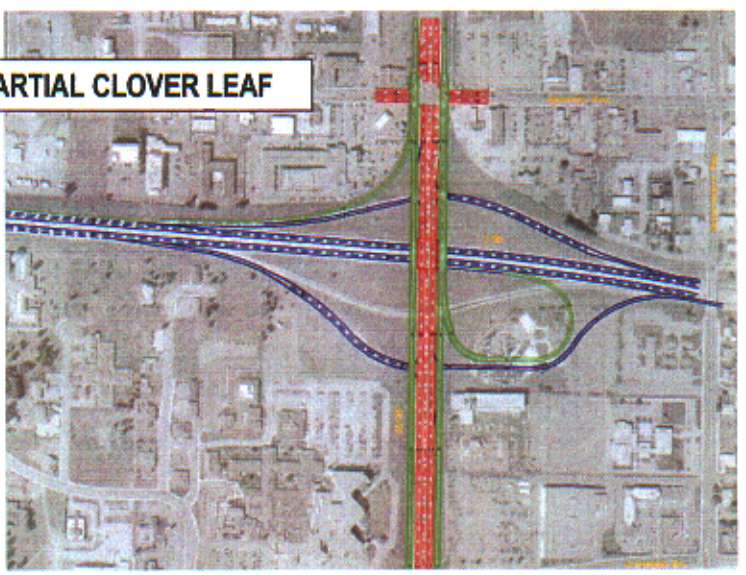
US 95 FLYOVER RAMPS (35 MPH)



US 95 FLYOVER RAMPS (45 MPH)



US 95 PARTIAL CLOVER LEAF



As illustrated in **Exhibit H-5** the conceptual engineering revealed that there is insufficient space to channellize U-turn pockets at some of the minor street intersections like Lacrosse and Emma Streets without requiring additional right-of-way, while channellized left turn pockets can be accommodated within the existing right-of-way and lane configurations. The purpose of the channelization improvements would be to better protect the future traffic capacity and operations on US 95. However, the result of these improvements would prohibit left turn movements from the minor streets and, without other arterial street improvements in the area, results in placing an even greater traffic burden on the local street system and Ironwood Boulevard.

The intersection of US 95, Walnut Avenue and Lincoln Way has long been problematic for both state highway and local traffic circulation, access and safety. Without arterial capacity improvements within the area both the Walnut/Lincoln Way and Ironwood Boulevard intersections will degrade to below acceptable traffic operation standards. Hence, the additional conceptual engineering study examined a number of options to develop solutions to these problems. **Exhibit H-6** illustrates a series of possible intersection enhancements ranging from simple intersection and local street realignment(s) to full interchange improvements, including the options of extending Harrison Street and a US 95 viaduct. Each of the options includes a partial realignment of US 95 to the west to better accommodate the various intersection or interchange concept designs. The realignment will require the need for additional right-of-way and displacement of some existing residences or businesses.

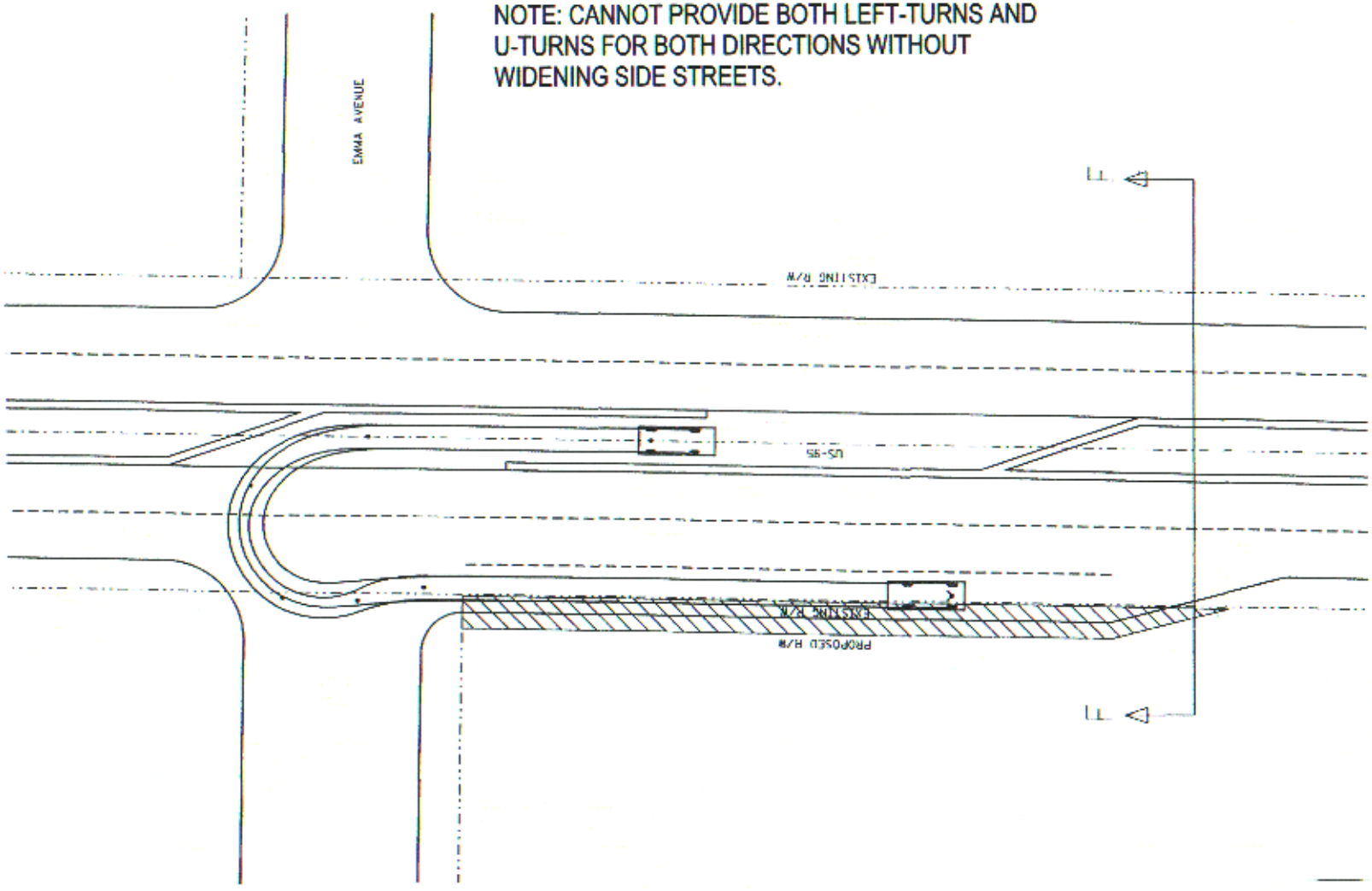
A new interchange on US 95 at the Harrison Street Extension would require additional right-of-way and the displacement of existing homes and businesses. This option would also require disconnecting the current ramp connections between US 95 and Northwest Boulevard. Harrison Street and Northwest Boulevard are located too close to each other to fit two interchanges on US 95. This option would significantly improve traffic operations on US 95, but was found unnecessary to meet the future traffic needs on US 95 within the next 20 years.

US 95 Ironwood Segment:
Example of Left and U-Turn Channelization

Exhibit H-5

DISTRICT 1
Idaho Transportation Department

NOTE: CANNOT PROVIDE BOTH LEFT-TURNS AND U-TURNS FOR BOTH DIRECTIONS WITHOUT WIDENING SIDE STREETS.



Ironwood Segment: Harrison Street Connector Options

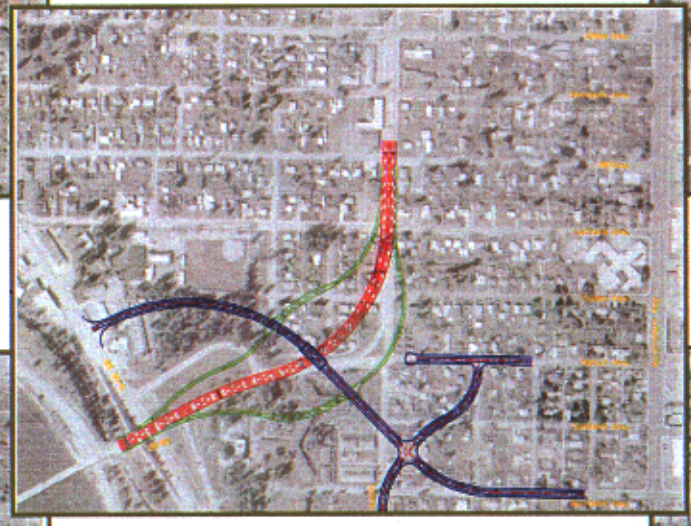
Exhibit H-6

DISTRICT 1
Idaho Transportation Department

AT GRADE INTERSECTION

PARTIAL INTERCHANGE AT WALNUT / LINCOLN

HARRISON ST. DIAMOND INTERCHANGE



HARRISON ST. PARTIAL CLOVER-LEAF INTERCHANGE

HARRISON ST. DIAMOND INTERCHANGE AND US 95 VIADUCT

Further examination of the viaduct option was conducted as part of the conceptual engineering to ensure that a continuous, grade separated highway facility is possible through the Ironwood segment of the study area. **Exhibit H-7** illustrates the viaduct footprint in the Ironwood segment and the ability to connect to the I-90 interchange (and possible expressway concept north of I-90) and possible Harrison Street interchange. The viaduct option would include two travel lanes, grade separated from the current US 95 mainline and local streets. The current US 95 mainline would be reduced from four to two travel lanes with a center left turn lane at major intersections.

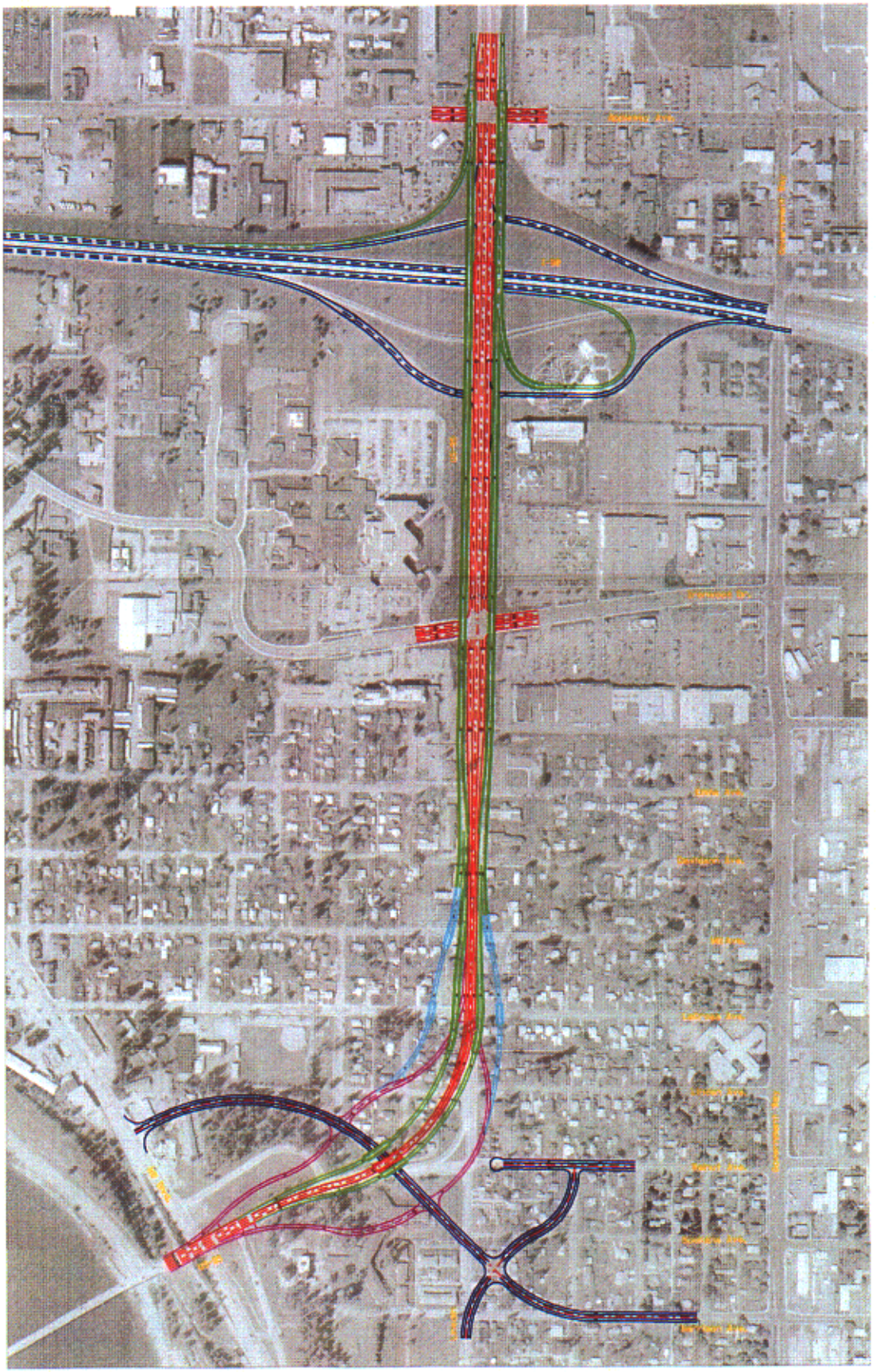
With supporting operation analysis of the future traffic conditions (see **Appendix E** - *Supplemental Traffic Analysis Report*) for each of these options, the following findings are made:

- A US 95 viaduct could be designed to connect to the I-90 and new Harrison Street interchanges, but is not needed to meet the needs of future travel demand within the next 20 years;
- The viaduct would require additional right-of-way within an established business corridor, and likely require the displacement of several buildings; and
- This option would fully address the State's access management policies for US 95.

US 95 Expressway Option
Ironwood Segment

Exhibit H-7

DISTRICT 1
Idaho Transportation Department



OVERVIEW OF

MAINTENANCE CONCERNS

FOR

---- US 95 CORRIDOR STUDY ---
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SPOKANE RIVER TO
OHIO MATCH ROAD

Idaho Transportation Department
District One
Coeur d'Alene, ID
April 5, 2002
rie

U S 95 STUDY

OVERVIEW OF MAINTENANCE CONCERNS

DISCUSSION OF MAINTENANCE CONCERNS – ALL ALTERNATIVES

A concern with any improvement or addition to the highway system would be the increased need for maintenance effort. In general, improvements being considered in the US 95 study would increase the complexity of maintenance operations. Some states are now recognizing this effect on manpower and cost by including maintenance cost considerations in project development. ("If we can't afford to maintain it, we can't afford to build it.")

For example, ITD presently maintains four through lanes and several auxiliary turn lanes on US 95 north of I-90. Any alternative adding frontage roads, and/or slip ramps, and/or interchange ramps, would increase vehicle miles of travel required to maintain the roadway surfaces significantly beyond the lane miles added to the system. Also, the existing highway configuration allows for snow removal across US 95 and abutting auxiliary lanes across a continuously paved surface. This would not be possible with separated frontage roads and/or slip ramps. Unless additional maintenance effort could be provided, the overall winter maintenance level of service would suffer.

Increased runoff due to more paved area within the right of way would also require additional maintenance effort. Most of the drainage from pavement surfaces currently percolates through the ditches and roadsides; very little runs off the right of way. Alternatives incorporating frontage roads will have about a 60 percent increase in paved, impermeable surface. This translates into a corresponding decrease in permeable area for drainage disposal -- and the need for drainage swales, piping and possibly pumping systems.

There are many maintenance issues that would be shared by all study alternatives. These concerns are discussed in the following items.

A. DRAINAGE:

(1) Local ordinances require that no storm water generated by a facility is allowed to leave the property. This consideration would require the construction of drainage swales within the roadway prism, or of a storm sewer system draining to a swale / pond at designated points adjacent to the facility. Available non-paved areas within the existing right of way would be very restricted in size, so consideration of additional right of way for swales must be made.

(2) Any storm sewer system would have to be designed to accommodate large volumes of anti-skid material. Inlet structures would have to be located and designed to be accessible to vacuum and flushing equipment.

(3) Pumping would be required for depressed roadway sections. Consideration must be made for access and maintenance to pumping stations. Power outages are also a concern, since water often falls during power outages.

(4) Evaluation of the continued need for existing cross drains should be made. Upstream conditions may have been changed by property development. If cross pipes would continue to be needed, siphons should not be used.

(5) Future pre-treatment of stormwater runoff may be required. Right of way needs for treatment facilities should be included in the design.

(6) A workshop in Coeur d'Alene, sponsored by DEQ and EPA will address stormwater design in cold climates. This presentation will include design recommendations that may significantly affect how ITD locates and constructs swales.

B. ROADSIDE FEATURES:

(1) Retaining Walls and Slope Paving: Frequently, walls are installed at the outer edge of the right of way without access to remove graffiti or to maintain the wall. Sufficient clear, flat distance from the wall face to the right of way line would need to be provided to allow for maintenance and repair access. A Genie-type scissors unit would require about 5 feet of flat area.

The transition area between the normal roadway shoulder and a wall should be designed with maintenance in mind. This space would be the concentration point for anti-skid material; lateral clearance from the wall for a pickup broom to operate must be provided.

Slope Paving: Slope paving should be provided for all areas where the slope exceeds 1 vertical to 3 horizontal. This slope ratio is the "convenience" level for mechanical maintenance of vegetation.

Slope paving should be designed to provide for ease in cleaning. Large amounts of anti-skid material collect on the surfaces, making it necessary to sweep and flush the surface with water.

(2) Vegetation management: Vegetation should not be provided in areas where the slope exceeds 1 vertical to 3 horizontal unless a local entity assumes responsibility for maintenance.

Access for vegetation management must be included in the design.

Vegetation control by chemicals would be a problem with the possible exception of the Huetter alternative. ITD equipment and chemicals are intended for non-selective broadcast application on large areas. Consideration should be made to hire commercial applicators for small landscaped areas and for landscaped areas in close proximity to residential and developed areas.

C. PAVEMENT MARKINGS AND SIGNING:

(1) Durable, all-season pavement markings would be critical to the proper operation of these alternatives. Expressway alternatives using the slip ramp / frontage road concept would have extensive merging maneuvers on US 95 and weaving maneuvers on the frontage road lanes requiring traffic to frequently cross lane lines.

(2) Special attention to the signing requirements for the interchange alternatives and for the frontage road system would be required. Lane definition for the frontage road system as it approaches the interchanges would be critical; for some alternatives, once a vehicle is in a lane, there would be no opportunity to change lanes.

D. ILLUMINATION:

(1) Continuous illumination may be required for slip ramp / frontage road configurations. These configurations would require almost continuous weave – merge maneuvers - from the expressway to the slip ramp; from the slip ramp to the frontage road; then to one of the up-to-three frontage road lanes.

(2) Headlight glare between various levels of roadways should be minimized. Also, glare at the interchanges would be a problem that can be minimized utilizing area lighting. Control of light spillage on the "house side" should be minimized through the use of cut-off shielding.

E. UTILITIES:

(1) Several alternatives would not provide sufficient longitudinal room to locate utilities and to maintain them without encroachment into adjacent roadways. A designated utility "corridor" should be provided to accommodate future growth without the need to dig up the highway facility or to interfere with traffic.

(2) All utilities should be contained in conduits and accessed through manholes or vaults.

F. WINTER MAINTENANCE:

Standards for winter maintenance have been developed by ITD (See Appendix). These standards are based on traffic volume, potentially hazardous areas such as intersections and ramps, accident reduction / cost benefit analysis, and available resources. US 95 through the study area presently is designated at Level 1.

For comparison, State Highway 41 is designated as Level 2. However, the difficult North Idaho climate of moist snow and frequent freeze-thaw cycles, and the resulting roadway icing conditions, require maintaining this route at Level 1. Winter maintenance of the Huetter alternative, with similar climate and terrain, would logically also be designated at Level 2, recognizing that for practical reasons, maintenance would normally be at Level 1..

The narrow cross section for the expressway and viaduct alternatives would necessitate removal of all snow to the right shoulder to prevent a build-up of snow and ice against the center median barrier. Frequent snow removal from the right shoulder area would be required for the viaduct alternatives. This procedure would be required to minimize the problem of vehicles vaulting over the shoulder and median guard rail when a ramp is created by the snow and ice.

Snow dump areas may be required for depressed expressway and for viaduct sections where adequate snow storage could not be provided within the limited right of way. Additional right of way at convenient locations adjacent to the highway facility should be considered for these alternatives. Trucking snow to disposal sites would significantly increase the effort required unless private trucking companies were used.

Dump areas should be designed anticipating the need for pretreatment of snowmelt water before it enters the aquifer.

Designs for Alternatives 1a – d north of Hayden and for the Huetter Alternative should consider drifting problems. The local highway districts have frequently closed their road system on the Rathdrum Prairie due to drifting snow. Also, ITD has closed State Highway 41 between Hayden Avenue and Rathdrum due to drifting.

Location of access points for expressway alternatives utilizing a frontage road / slip ramp system would require significant "dead heading" (travel across already cleared roadways) to clear snow and ice from the entire system ---- interchanges at one-mile intervals, crossroads at one-half mile intervals, and slip ramps about one-half mile each side of an interchange. See the Maintenance Routing example following this section.

Thermal mapping of the Huetter alternative would be recommended. Thermal mapping of the new location would isolate trouble spots to enable a roadway cross-section design to minimize frost and icing problems. Mapping of the existing corridor would not be necessary since District maintenance staff are familiar with the winter maintenance characteristics of existing US 95;

Frequent cleanup of traction products would be crucial for good air quality. The depressed expressway sections and the depressed frontage road lane for the SPUI alternative would have dust problems due to restricted airflow. Maintenance forces would be required to removal traction products from the roadways after each storm in order to meet air quality standards.. (Similar toWSDOT Spokane requirements for I-90 viaduct)

G. FRONTAGE ROADS:

(1) Jurisdiction: Undoubtedly, local agencies would want no part of frontage road and crossroad maintenance within a State highway right of way. Consideration should be made for agreements with the locals to, as a minimum, provide winter snow and ice control on the frontage and cross roads consistent with the agency winter LOS. This could take the form of cost sharing agreements or of outright transfer of responsibility for all aspects of maintenance and operation of the non-expressway portions of the facility.

The City of Coeur d'Alene's Snow Plan utilizes formation plowing (up to four plows wide) to clear all major routes* in the City within 4 to 6 hours. ITD presently does not have the resources to maintain a frontage and cross road system at this high level of service.

(2) Signing at local access points would potentially be a point of contention. Local businesses are always requesting additional highway signing. A depressed expressway would appear to them to require extreme measures to advise the motorist of their business. As an example, consider the opposition received by Spokane County to the one-way Sprague couplet and the opposition WSDOT had to the Division / Ruby couplet. Locations for logo signing for businesses must be a consideration for all alternatives.

*Ramsey, Government Way, 15th St , 4th St, 3rd St, Appleway, Kathleen, Hanley, Dalton, Harrison, NW Blvd, Ironwood, Atlas, and Sherman

H. EMERGENCY RESPONSE:

Emergency response has two aspects. One is ITD responding to safety needs, such as for snow and ice control. The second aspect is fire, police, wreckers and medical services servicing a crash scene. Consideration must be made for sufficient access points to be able to reach a scene; Variable message signing would be of assistance in advising motorists of restrictions and/or closures. Lengthy viaduct structures may require service points for fire suppression water.

I. PERSONNEL AND EQUIPMENT NEEDS:

DISCUSSION OF MAINTENANCE CONCERNS – ALL ALTERNATIVES

Snow and ice control are the critical activities for determining equipment and manpower requirements. In 1993, ITD and the University of Idaho developed the criteria used by the Department to determine manpower requirements.

LANE MILES PER SNOW REMOVAL UNIT*				
Winter Maintenance Level**	Urban	Flat	Rural, rolling	Mountain
1	12	35	20	5
2	12	40	28	14
3	20	40	30	20
4		40	36	25

*1993 ITD / University of Idaho study criteria.

** From Maintenance Manual, Section 330.0-B

(These criteria should be used with discretion, since it does not consider the resource needs for storms of > 8 hour duration, for frequent freeze/thaw cycles, and does not include a complexity factor urban roadway systems.)

A more precise analysis would be based upon the estimated time required to complete one snow removal cycle of each area under consideration. However winter maintenance needs can be put in a relative order using the U of I study criteria.

The minimum turning path for Intermediate Semi trailer (WB-40) Design Vehicle **typical city tractor unit** approximates the turning path for the Navstar 4900 single axle snow removal vehicles used in District One. **This must be the minimum turning path for any design feature.** (See Appendix)

The ITD maintenance management system does not capture costs such that maintenance activity cost comparisons could compared the various US95 Study alternatives. Also, there is no program available through ITD that would allow for "what if" comparisons of maintenance cost for the alternatives. So, all evaluations of maintenance concerns are subjective in nature.

SNOWPLOW ROUTING COMPARISON

Existing US 95 vs US 95 Expressway vs Huetter Alternative

					PERSONNEL REQUIRED[8]
EXISTING US 95 [0]	**Lane Miles in Section:**		**39.4±**		**3.3**
Pass Number	**PLOW ROUTING**	**MP**	**to**	**MP**	
1	START @ I-90, NB to SH53 [1]: lt thru lane	430.7		438.9	
2	SB to turnaround @ Marine Dr [2]: lt thru lane	438.9		429.2	
3	NB to SH 53: rt thru lane	429.2		438.9	
4	SB to turnaround @ Marine Dr: rt thru lane	438.9		429.2	
5	NB to Neider, outside lane	429.2		431.2	
5a	NB 1st pass: lt turn lane	431.2		438.9	
6	SB 1st pass: lt turn lane	438.9		431.2	
6a	Neider SB, outside lane to Marine Dr	431.2		429.2	
7	Lt turn, 2nd pass, NB	429.2		438.9	
8	Lt turn, 2nd pass, SB	438.9		429.2	
9	Rt turn Lane, NB	429.2		438.9	
10	Rt turn Lane, SB	438.9		430.7	
	PASS MILES [3]:		**94**		
US 95 EXPRESSWAY w/ frontage roads	**Lane Miles in Section:**		**68.3±**		**5.7**
Pass Number	**PLOW ROUTING**	**MP**	**to**	**MP**	
1	START @ I-90, NB lt lane thru to SH 53, x over	430.7		438.9	
2	SB lt lane thru to turnaround @ Marine Dr [2],	438.9		429.2	
3	NB outside lane to SH 53, x over	429.2		438.9	
4	SB outside lane to turnaround @ Marine Dr,	438.9		429.2	
5	NB rt lane to slip ramp,slip ramps to Boeckel Rd	429.2		437.8	
6	SB slip ramps to rt lane to Marine Dr	437.8		429.2	
7	Marine Dr to SH 53 via Fr Rd left lane	429.2		438.9	
8	x over, SB Fr Rd left lane to Neider	438.9		431.2	
9	x over, NB Fr Rd right lane to SH 53	431.2		438.9	
10	x over, SB Fr Rd right lane to Neider,	438.9		431.2	
11	x over, NB to US 95 slip ramp, move to new section	431.2		432.3	
	PASS MILES [4]:		**88.4**		
HUETTER ALTERNATIVE [5]	**Lane Miles in Section:**		**44.6±**		**2.2**
Pass Number	**PLOW ROUTING**	**MP**	**to**	**MP**	
	START @ I-90 WB TO SH 53	0		9.5	
2	SH 53 SB TO I-90 WB	9.5		0	
3	I-90 WB to SH 41 IC & RETURN TO HUETTER NB		4.5		
4	HUETTER NB TO SH 53, X-OVER	0		9.5	
5	HUETTER SB TO I-90 EB	9.5		0	
6	I-90 EB TO NW BLVD & RETURN		4.2		
7	HUETTER NB SHOULDERS & RAMPS	0		9.6	
8	HUETTER SB SHOULDERS & RAMPS	9.6		0	
9	TO IC EASTBOUND				
	PASS MILES [6]:		**65.9**		

:NOTES:

0. Assumes 4-lane US 95 extended northerly from Wyoming Ave
1. Northbound turnaround @ SH 53 and US 95.
2. Marine Drive @ south end of Spokane River Bridge. Other turnaround option would be to take NW Blvd off ramp, make left turn across SB NW Blvd traffic, take US 95 on ramp, return to US 95 NB. ((DANGEROUS))
3. Pass miles include additional "dead head"mileage necessary to plow lt and rt turn bays
4. Pass miles include additional "dead head" mileage necessary to plow frontage roads and slip ramps.
5. Assumes maintenance of any frontage road facilities by local entity.
6. Pass miles include additional "dead head" mileage necessary to plow trumpet IC @ I-90 and plow ramps for Huetter Alternative interchanges.
7. All calculations are estimates as design configurations for the various alternatives are not available.
8. Based on 1993 U of I study.

DISCUSSION OF IMPACTS FOR ALTERNATIVES 1a – 1d.

Impacts for US 95 Expressway alternatives are shown on the attached spreadsheet.

In general, more effort would be required to maintain depressed highway sections than a similar at-grade section. Certainly this would be true for US 95 north of I-90. Keeping the crossroads at grade, with frequent interchange and grade separation structures over US 95, would mean US 95 would be depressed throughout this section, or as an option, have a roller-coaster profile. In general, costs to manage storm water would be higher; cleaning costs would be higher; and snow removal costs would be higher.

Drainage: Additional right of way may be required for some of the alternatives in order to provide sufficient area for drainage swales. About 6 sq ft of drainage area per running foot of highway would be required. This would require a minimum of 12 feet of unpaved width.

The available, unpaved area would be very limited; for example, there is about 20 feet available on the westerly side of the roadway prism for the alternatives incorporating the frontage road / slip ramp option. In order to use the available areas, pumping from the depressed highway section would be required.

Changing land use adjacent to the highway facility would necessitate reevaluation of the need for the many cross-drain culverts provided in the original 1970's construction. Kootenai county's requirement for on-site drainage at the adjacent properties may eliminate the need for many of these culverts; If culverts are needed, the use of siphons must be avoided.

Utilities: Underground utility crossings are concentrated at the crossroads. These crossings would be incorporated into the interchange structures. Several "future" utility casings were installed with the original construction. There are many waterline and sewer crossings. For example, a 24" water line crosses at Lacey Avenue, this crossing would not have a structure to support the water line.

There is a basic concern about traffic flow for the connection between the Expressway and a Viaduct Alternative.

CONCLUSION:

The concept of an expressway would work for any of the interchange configurations developed. Functionally, for maintenance there is no clear cut difference between Alternatives 1 a, c, or d. It appears that the greatest difference in effects on maintenance would be in the amount of walls and slope paving required

Alternative 1 b would have the lowest level of maintenance effort required because it does not include frontage roads,.

MAINTENANCE ISSUES

All alternatives compared to neutral effect
++++ = Alternative having most impact

ALTERNATIVE:	DRAINAGE	WINTER MAINTENANCE SNOW / ICE CONTROL	SWEEPING / CLEANUP	EMERGENCY RESPONSE	ILLUMINATION	SIGNING / PVMT MARKING	WALLS / SLOPE PAVING	VEGETATION MANAGEMENT
1a: Expressway with frontage roads, over crossings and ramps	+= slip ramps and frontage roads require additional drainage structures and storm sewer	+ = Addition of lane miles to system - frontage roads and interchanges. Routing to cover all roadways within a segment will requre 40%± more travel than area to be plowed would require.	+ = Addition of lane miles to system - frontage roads and interchanges Restricted cross section would require pick-up brooming on all roadways	+ = more complex with combination of interchanges, grade separators, frontage road	+ = more complex, merge / diverge maneuvers on slip ramps and frontage road lanes	"+ = motorists not familiar with ramps being separate from interchanges	++ = more complex due to additional lanes confined in right of way.	++ = small, difficult areas to maintain
1b: Expressway with diamond interchanges, no frontage roads	neutral	neutral	neutral some room for sidecast brooming.	neutral access at interchanges - one mile intervals.	neutral no special complexity	neutral conventional, familiar to motorist	neutral	+ = more area to maintain - no frontage roads
1c: Expressway with roundabout interchanges and frontage roads	+= slip ramps and frontage roads require additional drainage structures and storm sewer	+ = Addition of lane miles to system - frontage roads and interchanges.	++ = Addition of lane miles to system - frontage roads and interchanges Restricted cross section would require pick-up brooming on all roadways	+ = more complex with combination of interchanges, grade separators, frontage road	+ = more complex, merge / diverge maneuvers on slip ramps and frontage road lanes	++ = complex symbol signing @ each leg of roundabout ++ = permanent pavement markings due to many weaving maneuvers	+++ = complex with additional walls for large roundabout structures at interchanges.	++ = small, difficult areas to maintain
1d: Expressway with single point urban interchange and frontage roads	++++= most complex with depressed US 95 and through frontage road lane	++++ = most complex with depressed frontage road through lane.	+++ = Addition of lane miles to system - frontage roads and interchanges Restricted cross section would require pick-up brooming on all roadways	+ = more complex with combination of interchanges, grade separators, frontage road	++++ = most complex with depressed frontage road lane	+++ = most complex signing due to single point of intersection +++ = permanent pavement markings to delineate lanes leading to single point.	++++ = most complex with walls for depressed frtg road lane	+++ = most complex with depressed frtg road making smaller areas
	*note: Additional right of way may be required for the frontage road alternatives. Unpaved area within the right of way will be limited; for example, there will be about 20' available at the westerly side of the roadway prism. Pumping will be required to use these areas.	**note: areas outside the right of way may be necessary for storage of snow removed from the expressway.					***note: All alternatives having frontage roads would be expected to have extensive walls to retain frontage rd embkmts within right of way.	

Alternative 2 would provide a new, north-south limited access expressway facility on the approximate alignment of the existing Huetter Road. The Alternate would begin with an interchange for access to Interstate 90, then extend northerly along the Huetter Road alignment to about Lancaster Road where the alignment would turn easterly to roughly parallel the SIRR tracks to a connection with State Highway 53 and US 95.

Problems to be considered include potential conflict with the airport clearance envelopes, drifting snow between Prairie Avenue and the northerly US 95 junction, and crossing the SIRR tracks in close proximity to US 95 and SH 53.

MAINTENANCE CONCERNS:

General Maintenance: General maintenance of the expressway would be similar to that for any four-lane facility. The frequency of interchanges and grade separation structures would make bridge maintenance effort higher than on most four-lane sections within District One.. However, the costs would be lower than for any of the expressway options 1a through 1d on the existing US 95 corridor.

Winter maintenance: Winter maintenance would be typical as for a four lane interstate highway. Access to both ends of the segment would be via interchange to I-90 and to US 95. Access for snow removal and other emergency equipment would also be via the major cross streets such as Prairie Ave and Hayden Ave. Traction materials could be provided from the Ramsey Road, District Yard or Rathdrum stockpiles. If the Huetter expressway would be added to ITD's responsibility, additional resources would be required.

Drifting snow: The Post Falls Highway District and the Lakes Highway District report drifting problems generally north of Prairie Avenue. ITD has also experienced drifting on State Highway 41 between Prairie Avenue and Rathdrum. This problem should be considered in the design of the highway facility. Design to prevent or minimize drifting snow would require flat cut and embankment slopes to promote a smooth wind flow over the road surface. A high maintenance option would incorporate provisions for manufactured or vegetative snow fences. Fences are normally located about 35X fence height (75 – 150 feet) from the road, so this option would necessitate additional right of way or drift easements from adjacent property owners. (SHRP REPORT H-381)

The expressway would be superimposed on the Rathdrum aquifer. Pumping stormwater runoff to a swale system would be required for any depressed expressway or local road option. Future requirements for pretreatment (removal of roadway pollutants) of the stormwater runoff should be anticipated and adequate right of way provided for a treatment facility/s.

ALIGNMENT CONCERNS:

The intention would be to construct the new expressway easterly of the existing Huetter Road right of way. Huetter Road would then function as an arterial frontage road connecting to the expressway at designated locations. Basic right of way width would be 200 feet. However, additional right of way would be required for construction of interchanges on one mile intervals. Assuming about 200' between the centerline of the expressway and the ramp / cross road terminals, and an additional 250'± to the intersection of the cross road and Huetter Road, a 300± ft offset of the expressway alignment to Huetter Road would be required at each interchange.

The alignment offset could be less at grade-separation structures, but Huetter Road would have to be reconstructed to match the elevation difference between the crossroad and Huetter Road. (~750' of distance along the crossroad required to develop the elevation difference between the expressway and the cross road). Also, consideration should be made of the need for a frontage road on the easterly side of the expressway right of way.

Allowing the Huetter Road alignment to control the location of the expressway alignment would result in a sinuous horizontal alignment for the expressway. Allowing the airport clearance requirements to dictate the profile for the expressway would result in the problems associated with a depressed roadway.

CONCLUSION: It would be best to set the proposed alignment of the expressway and let the alignment of Huetter Road "float" as necessary to accommodate grades and interchanges. This concept would also allow the expressway alignment to vary as necessary to accommodate airport vertical clearance requirements without depressing the expressway.

EXPRESSWAY IN PROXIMITY TO THE COEUR D'ALENE AIRPORT:

Airport management has expressed a concern that the proposed location of the expressway easterly of the existing Huetter Road would conflict with FAA runway clearance requirements. A potential vertical clearance conflict point would be the interchange at Huetter Road and Hayden Ave. The highway facility would probably be no higher than 70 feet above the existing ground (el. 2268 from USGS Quadrangle Sheet) in the proximity of the airport (5' fill + 22' structure @ interchange + 40' luminaire at the Hayden / Huetter interchange). By scaled distance from NRCS aerial photos, the Huetter Alternative would be about 3,000'+ from the southwesterly end of Runway 5-23 (el. 2282), and about 13,000 feet (runway c/l extended) from Runway 1-19 (el. 2301).

The Coeur d'Alene Airport Master Plan (June 1999) includes a discussion the issue of runway extensions for runways 5–23 and 1-19. The conclusions about runway extensions are:

"Runway 5-23: "therefore, at 7,400 feet, Runway 5-23 provides adequate length for the aircraft operations forecast during this planning period*, based on the generalized FAA criteria." (*20 years) (Underlining added)

"Runway 1-19: " Therefore, the current length of Runway 1-19 (5,400 feet) is considered adequate for the traffic that can be reasonably expected to utilize the runway during the planning period*.

The only construction alternatives discussed for these runways are for improvements to the runway surface. The Master Plan does not contain any proposal to extend runway 5-23 or 1-19 toward Huetter Road.

Therefore, any expected impact upon airport operations would be through encroachment into the various clear zones and approach surfaces. The designated elevation for the airport is 2,318 feet above MSL, although Runway 5-23 is elevation 2282 at its closest to Huetter Road. Ground elevation along the proposed Huetter Road alignment ranges from 2260 to 2280 based upon information from Hayden, ID 7.5 minute quad sheet.

AIRPORT CLEAR ZONE / OBSTRUCTION TO AIR NAVIGATION:

Based upon the FAA criteria shown on page 12, the Huetter Road facility should not intrude into any of the clearance surfaces for the Coeur d'Alene Airport. However coordination with the airport and the FAA would be required because the highway facility might intrude into a clearance surface defined at 100:1 from Runway 5-23 (3,000± / 100 = 30' high = el. 2298)

CONCLUSION:

The Huetter Alternative, if developed, must be designed as a limited access expressway. The primary purpose of a highway is to move people and goods. It would be short sighted and repetitive of the existing US 95 corridor to provide any lesser service. At the time US 95 was designed and constructed in the late 1960s and early 1970s, public and political opinion was that the full capacity of existing US 95 would never be used; that access to adjacent undeveloped land was more important than control of access. Now, the public and political agencies wonder why ITD was so short sighted as to not provide a limited access facility.

Also improvements to the local road system would be critical to the success of this facility. Without improvements to the east – west road system consistent with the KCATT Master Plan, use of the Huetter expressway would be limited primarily to through traffic. With the addition of improvements to the local road system, the Huetter expressway would function as the major arterial for north-south traffic movements in the Coeur d'Alene – Post Falls area.

COEUR D'ALENE AIRPORT CLEARANCE REQUIREMENT:

FROM FEDERAL AVIATION REGULATIONS 77.23

Note: Referenced from established elevation for Coeur d'Alene Airport @ NE end of Runway 5-23 = el 2318.

A	Height over 500' above ground level @ site of object	**No Conflict**
B	Height > 200' above airport elevation; < 3 miles of airport	**No Conflict**

FROM FEDERAL AVIATION REGULATIONS 77.25

Note: Referenced from established elevation for Coeur d'Alene Airport @ NE end of Runway 5-23 = el 2318.

A	Horizontal Surface: @ el. 2468, radius 10,000 feet	**No Conflict**
B	Conical Surface: From horizontal surface periphery outward and upward @ 20:1 for 4,000 '	**No Conflict**

Note: referenced from SW end of Runway 5-23 = el. 2282

C	Primary Surface: 200' X 1,000' @ end of runway	**No Conflict**
D	Approach Surface: Surface centered on runway c/l, beginning @ Primary Surface. Expands to 16,000 ' wide and 10,000 from runway on 50:1 slope.	**No Conflict**
E	Transitional Surface: Surface centered on runway c/l. Extends @ slope of 7:1	**No Conflict**

FROM AIRPORT ADVISORY CIRCULAR 150/5300-13, CHG 5 & 6

212: Runway Protective Zone: Area cleared of "incompatible objects" 2,500' Long x 1,750' Wide Max from end of runway 5-23 — **No Conflict**

FROM ITD PRELIMINARY DESIGN

Highway facility within 100:1 envelope from end of runway. — **Notification Required**

Alternative 3 would provide eastbound to northbound, and southbound to westbound grade-separated "fly-over" ramps between I-90 and US 95. Options would provide for either a 45-mile per hour or a 35-mile per hour design for Ramp AD.

General maintenance items considered in this analysis include:

- **Drainage:** All alternatives have similar impacts. The present storm water volume carried by the storm sewer system outfall to I-90 exceeds the design capacity so all drainage should be handled within the interchange. Adequate area is available for drainage swales. Pretreatment of runoff may be required.

  Drainage removed through the structure and down the columns should include design consideration to accommodate the heavy use of aggregate sanding material – large catch basin grate openings, no flat grades in the piping, large diameter 8+" piping, easy, frequent access to clean outs.

  Expansion joints on the structures should be self cleaning, "sanding material proof".

- **Illumination:** All alternatives have similar impacts. With at least three levels of
- structures, high level area lighting may be an option.

- **Utilities:** No effect on utility accommodation.

- **Signing and pavement markings:** Providing and maintaining durable, all-season pavement markings would be a priority, particularly at weave and merge points.

  Proper lane assignment will require the use of overhead sign structures on I-90. Other signing would be normal to an interchange.

- **Winter maintenance:** The existing diamond interchange is the easiest configuration to provide snow and ice control. Even though vehicles must pass through traffic signals, there are options available for continuing snow and ice control work, i.e., a plow truck approaching from I-90 eastbound has the option of returning west, going north or south, or continuing across the crossroad and returning to I-90 eastbound.

  With the Alternative 3 options, there are no routing alternatives once the plow truck enters the ramp; the options of continuing easterly, southerly or returning to I-90 westbound are not available without considerable out-of-direction travel.

  The elevated structure will require more time and care to clear snow and ice because of the adverse combined effect of roadway grade and superelevation. Effective grades near 7 percent (superelevation and profile grade) will be required between ramp lane convergence points and the vertical clearance points over US 95. This grade is excessive for slow moving vehicles such as snowplows; the vehicle has a tendency to slide to the low side of the super. If such a vehicle has to stop on the grade, it is nearly impossible to start up again without mechanical aids such as chains. This might be a site to consider the use of an automatic anti-icing system.

ALTERNATIVE 3a: FLY-OVER:

The minimum curvature used would require a superelevation rate e = 0.08 ' / ft., giving an effective cross slope near 7 percent This effective cross slope could be lowered to around 5 percent by moving the ramp terminals further from actual ramp highway / street crossing points.

ALTERNATIVE 3b: MODIFIED CLOVERLEAF RAMP: There are two possibilities for this modification. (1) The first would gain about 22 feet to tie to the shoulder elevation of existing US 95. (2) The second would need to rise over 40 feet to meet the shoulder elevation of a US 95 viaduct. Either could be done at 3 percent or less grades.

CONCLUSION:

Grades for the fly-over ramps or the modified cloverleaf ramp should be minimized.

The most significant negative impacts upon maintenance efforts would be in routing snow removal equipment and adverse grades for the ramps. As mentioned above, the routing flexibility is gone.

Alternative 4a for US 95 (Lincoln Way) would provide a physical barrier on the continuous turn bay for the existing 5-lane facility. A grade separation structure would be provided to carry LaCrosse Avenue under Lincoln Way. Channelized left turns would be allowed at Emma and Mill Avenues. Right-in - right-out turns would be allowed at other intersections.

Alternative 4d would allow for passenger type vehicles to make U-turns at selected locations; there is insufficient street width for single unit truck and larger vehicles to make this U-turn.

GENERAL COMMENT:

ITD's maintenance responsibility would change little if at all. However, the complexity of this maintenance would be much greater. ITD or the City of Coeur d'Alene would have to install and maintain channelization and signing at the right-in, right-out intersections.

The drawings show a U-turn pocket in one direction only. The analysis should include U- turn pockets for both directions of travel on Lincoln Way. Attaining two-way pockets and while providing for U-turns may not be possible without modifications to the cross streets.

Traffic volumes would have to be analyzed to determine if there would be sufficient gaps to make U-turns feasible.

RIGHT OF WAY: The City requires 8-foot wide sidewalks in commercial areas. The typical section shown for Alternative 4d would only accommodate a 4-foot wide sidewalk. The additional width required would have a significant impact on commercial property.

WINTER MAINTENANCE: Snow removal would be more difficult for ITD, and much more difficult for the City of Coeur d'Alene.

- Presently, ITD plow trucks are able to clear the continuous turn lane while plowing the Lincoln Way through lanes. City plow equipment plows across the intersections.
- With a continuous median barrier, ITD plow trucks would have to plow through a turn bay and then enter the City street system; then drive through the City street system to return to Lincoln Way. The City street system would have to be improved by restricting on-street parking or by widening the street widths and curb radii to handle ITD plow trucks.
- This problem could possibly be handled through a State / City maintenance agreement. City snow removal vehicles would need to cross the US 95 barrier through the channelized turn bays to work on the City street system. If the City cleared the turn bays, the State could concentrate on clearing US 95.

DRAINAGE: Lincoln Way is drained by a storm sewer system extending from Ironwood Avenue southerly along US 95 to the Spokane River. The City has responsibility for maintenance. At the LaCross intersection, the storm sewer is buried

about 6 feet deep. The storm sewer, water line and sanitary sewer would have to be accommodated in the grade separation structure. The depressed section of LaCross will have to be pumped up to the storm sewer system.

LACROSSE AVENUE: The traffic signal at US 95 and Lacrosse would be removed and LaCrosse Avenue would be depressed about 20 feet below Lincoln Way. Provisions would have to be made to replace the at-grade pedestrian crossing presently used heavily by school children.

The distance on LaCrosse required to develop this 20 foot depth would require closing Nora St at LaCrosse, and closing C Street at LaCrosse (page 772, 2001 AASHTO Geometric Design Manual). While there would be little or no impact on ITD, these closures, together with median closures of Lincoln Way, would have a significant adverse effect on the City's maintenance operations.

CONCLUSION: There are many negative impacts and few positive ones. The impacts upon the City probably would not be acceptable to City management without provisions to continue the continuity of the City's maintenance routing..

Alternative 4b would realign US 95 northwesterly and realign the intersections of Lincoln Way and Walnut Avenue to provide a common "T" intersection with US 95.

Impacts to ITD: The present intersection is confusing to motorists, hard for ITD to maintain, and difficult to provide directional signage. This proposal would:

- Eliminate maintenance of vegetation on traffic island.
- Eliminate right angle turn for US 95 northbound traffic. It is difficult for snow removal equipment to clean the present intersection without having to back up in traffic or having to go onto the local street system to turn around..
- Require signing for conventional "T"intersection. Present intersection operates as 3-way stop, an unfamiliar configuration for motorists.
- Enhance traffic flow -- US 95 would "flow" through the intersection without the 90 degree turn to traverse and without channelized turn bays to contend with.
- The total landscaped area would be significantly increased. Responsibility for landscaping should be assumed by the City of Coeur d'Alene.
- Require additional traffic signal at intersection of Walnut and US 95.
- Purchase of the commercial property fronting on US 95 between Walnut and Linden Aves. if Linden Avenue is dead-ended.

IMPACTS TO CITY OF COEUR d'ALENE:

- Increase in landscaped area to maintain.
- Linden Avenue either would be dead-ended at Lincoln Way or would have to be redirected south to the Lincoln Way / Walnut intersection.
- Installation of traffic signals at Walnut Ave and Government Way and at new intersection of Northwest Boulevard (southbound) and Walnut.

RECOMMENDATION: Construction of this alternative has been discussed and debated since the late 1960's. It is time to take advantage of the US 95 Study to program this improvement. The properties on the northwest side of the present curve consist of low value rentals and a vacant property (for sale as of 4-05-02).

RIGHT IN / RIGHT OUT TO / FROM US 95 @ NORTHWEST BOULEVARD

This Alternative would provide for the reconstruction of the US 95 / Northwest Boulevard Interchange to restrict traffic to right in / right out movements.

DRAINAGE: The existing storm sewer servicing this interchange discharges into the Spokane River at the Spokane River Bridge. Any additional runoff generated by the proposal could be handled using drainage swales within the existing right of way.

TRAFFIC CIRCULATION: Right in / Right out traffic would create circulation problems for snow control equipment. For instance, a plow truck operator on Ramp CD wanting to plow northerly would have to travel south of the Spokane River bridge to a maintenance turnaround or the nearest intersection south of the bridge in order to turn around and plow the north-bound lanes.

GRADES: The proposed CD ramp from Northwest Boulevard to US 95 Southbound would be at a grade > 5.6 percent. This would create a difficult starting problem for large vehicles entering US 95 unless an acceleration lane would be provided.

CURVATURE: Existing BC ramp has 130 foot inside radius. For the CD ramp to fit inside BC ramp, the minimum approach radius would be about feet. (this would be similar to the eastbound I-90 off-ramp at State Highway 41). AASHTO Geometric Design(2001) recommends a three-centered curve for the WB-67 design vehicle. This curve could not fit inside the existing ramp. A minimum radius design could be used; however superelevation would be in excess of 0.08 '/ft. This superelevation rate is excessive for tractor – trailer or snowplow units moving up-grade under maximum power.

Ramps AB and DA would be realigned to create a turning roadway at the signalized intersection with Northwest Boulevard. Since WB-62 (53'trailer) units will be using the intersection and ramps, attention to the turning roadway is critical. Right of way would be required from Coeur d'Alene Homes

AUXILIARY LANES: An acceleration lane for CD ramp should be provided. Traffic entering US 95 should not be required to stop, as starting on the grade, super and curve would be difficult, if not impossible for tractor-trailer units and for snow removal equipment. It appears that an acceleration lane taper would have to be carried about 150± feet onto the Spokane River bridge.

Deceleration lanes should be provided for the BC Ramp and for the DA Ramp. Both of these ramps will require minimum radius curves to minimize impact on adjacent properties. Without deceleration lanes, turning traffic slowing to 15-20 mph for these curves would significantly impact through-traffic.

SIGNING: Signing for side by side ramps such as A -- AB and BC –CD is difficult. Motorists do not expect this configuration, so preventing wrong-way moves will be a problem. A conventional 4-way intersection would be easier to sign and maintain.

SUGGESTION:

The right in – right out concept could be developed for the existing DA and AB ramps to provide a conventional 4-way, signalized intersection with Northwest Boulevard. This would provide motorists with a more familiar intersection than trying to sign and delineate side by side DA and AB ramps. Right of way would be required from Coeur d'Alene Homes for any configuration to provide turning roadways to an intersection rather than the present slip ramp entrance.

DISCUSSION OF MAINTENANCE IMPACTS ALTERNATIVE 5a and 5b: US 95 AND HARRISON / WALNUT INTERCHANGE

Alternative 5a: **At grade improvements to intersection of US 95 and Walnut / Northwest Blvd.**

It is difficult to find anything good about this alternative.

Disadvantages include:

- Left hand exit ramp for southbound US 95 to Walnut Avenue,
- Does not provide for Walnut Avenue to US 95 southbound traffic maneuver,
- Short distance from US 95 grade separation structure to Walnut Avenue. A combination of elevating US 95 and depressing the ramp would be required to effect the required grade separation clearance.
- Closes Linden and LaCrosse Avenue intersections with US 95. Could require closure of Mill Ave for northbound ramp merge area.
- The Northwest Boulevard ramp BC would become right-in / right-out only. Possibly the AB ramp would also be right-in / right –out - no turn bay is shown.

Advantages include:

- Provides priority for US 95 traffic.

RECOMMENDATION:

This alternative has too many disadvantages to merit further consideration.

Alternative 5b:

Option (1): **Diamond Interchange / new connection from Harrison Ave to Northwest Blvd.**

Option (2): **Modified Diamond / Cloverleaf Interchange / new connection from Harrison Ave to Northwest Blvd.**

General Comments:

This alternative would provide a missing link in the City's present east –west street system - from Government Way to Northwest Boulevard. As originally envisioned, Walnut Ave was the "gateway to the City" from US 95; but it was never improved to provide a good connection east of Government Way. It would be better to close Walnut Avenue than to close than Harrison Avenue, the major east-west link to 15th Street.

The elevation rise from the Spokane River bridge to LaCrosse Avenue would allow US 95 to be depressed at the Harrison Avenue crossing without creating a drainage dip problem. Adequate swale area would be available in the existing interchange area.

For maintenance operations, the conventional diamond configuration would be best. The diamond provides better circulation options in removing snow and ice. Side

by side ramps, such as for the modified interchange, create problems for operators intending to continue plowing to the north.

The northbound ramps could be shifted northwesterly to be closer to US 95, minimizing the impact on property in the 1200 block of Lincoln Way. The northerly wing of the Coeur d'Alene Homes would be taken in any case.

The modified diamond / cloverleaf configuration would lower the impact on the Coeur d'Alene Homes property, but the impact is still significant enough that the lesser right of way taking would not override the unconventional configuration.

RECOMMENDATION:

Alternative 5b (1) Harrison Connector with diamond interchange, would provide the highest overall level of service to the public and to maintenance forces .The diamond configuration is more familiar to motorists than the modified cloverleaf and provides greater routing options to maintenance personnel. The modified cloverleaf has greater opportunity for wrong-way maneuvers at the easterly ramp entrance/exit.

Alternative 5c consists of US 95 improvements for staged long-term, beyond 20 years, improvements between the Spokane River and Interstate 90.

This alternative would provide an elevated viaduct roadway between the Spokane River and Appleway Avenue. At its southerly terminus, the elevated structure would be connected to existing US 95 and the local street system using one of the Alternative 5b interchanges at Harrison / Northwest Boulevard. The northern touch down point would be near Neider Avenue.

Local-and regionally-oriented traffic would be carried on the existing, at-grade alignment of US 95 (Lincoln Way). There would be no any access from the local street system to the elevated US 95 between the terminal points.

- The typical section shown by the consultant for the "Minimum Viaduct Section, Ironwood Area" could not exist. The narrowest portion of this alternative appears to be near Davidson Avenue where there would be at least two viaduct lanes for each direction of travel -- one through-lane and one on- or off- ramp. This configuration would require a cross-sectional width of about 120 feet. . Additional width beyond the120' would be required for lateral clearance to the building set-back line.

- If this alternative would be selected for further development, consideration should be given to spreading the viaduct structures laterally to remove any overhang over Lincoln Way. This would increase the right of way required to about 140 feet but there would not be much additional impact on the businesses abutting Lincoln Way

The AASHTO Green Book recommends 15 – 20 feet (page 526) clearance from the viaduct to the building set-back line. In order to protect this lateral clearance, sufficient right of way should be acquired. Any structure constructed at this clearance line could be subject to damage from flying snow and ice. If a sidewalk were constructed at the right of way line, there would be concern about snowplowing operations throwing snow and ice on pedestrians below. Even the best of operators, under the best of conditions, sometimes cannot anticipate road conditions; a large chunk of ice flying at 25-30 mph would do extensive damage to adjacent buildings or to pedestrians.

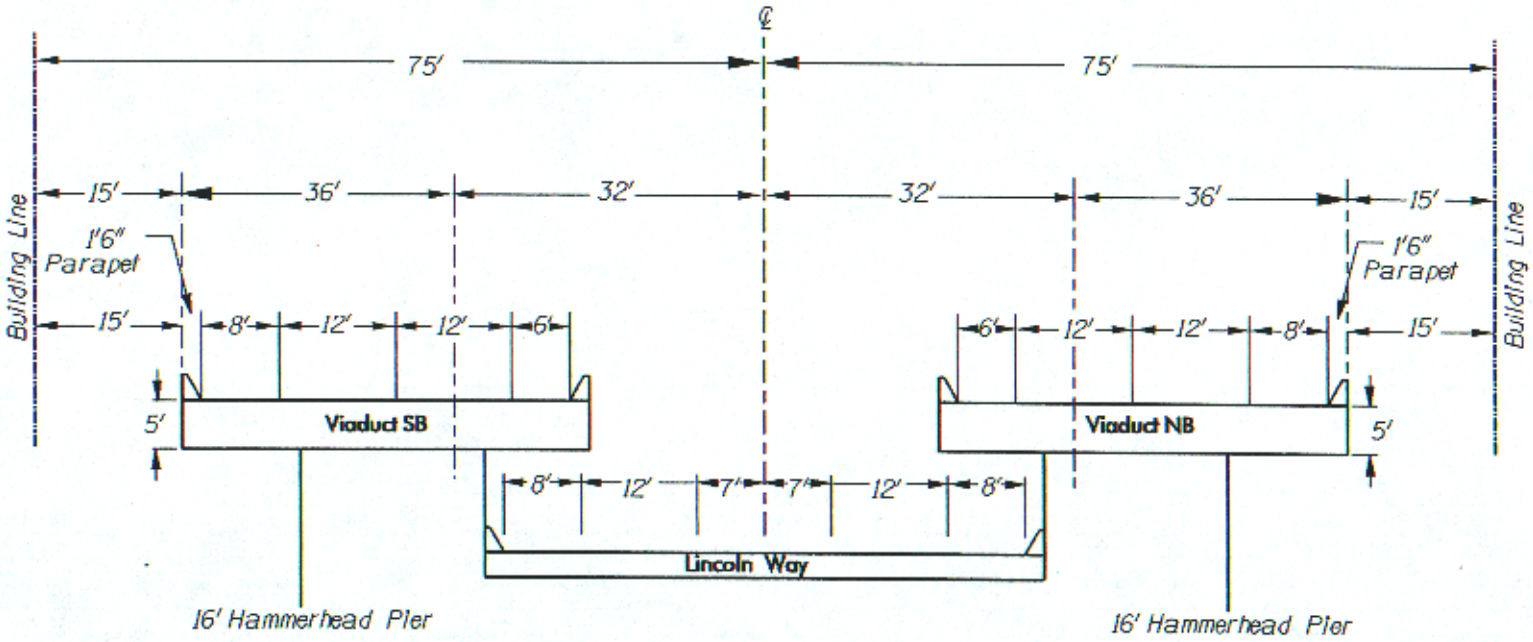
District maintenance personnel expressed the opinion that they would be required to use a motor grader to remove snow and ice. This is a low-speed vehicle that would be able to move snow and ice across the pavement without "lifting" it and throwing it over the side. Snow would then have to be loaded and hauled from the structure. Normally, the motor grader would not be the vehicle of choice for snow and ice control, since it is slower than a truck plow and presents a greater accident potential for conflicts with traffic.

Noise created by vehicles on the viaduct structure would be significant. Noise barriers high enough to intercept sound from these vehicles would not be feasible. Ongoing complaints about noise could be expected. Particular attention should be paid to expansion joint design – self cleaning for antiskid material and to minimize impact noise.

RECOMMENDATION:

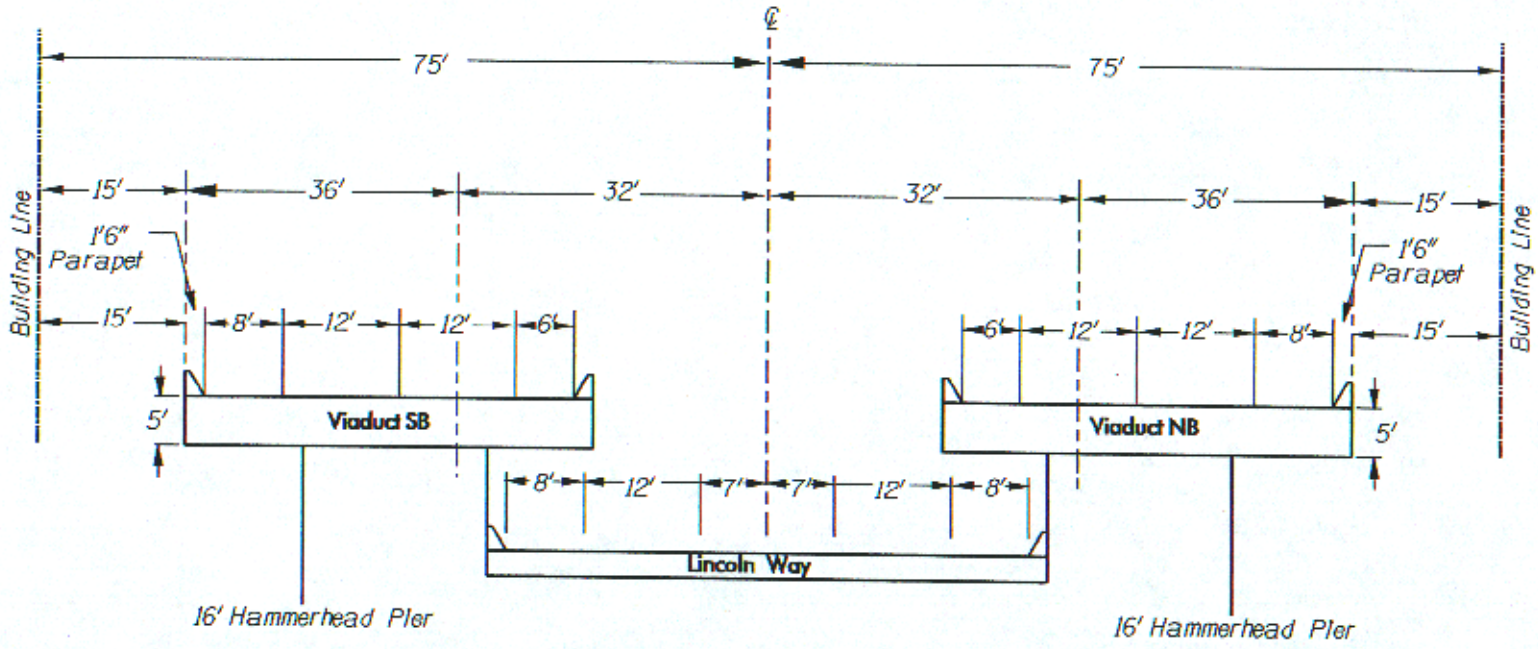
Additional right of way would be required for any viaduct concept. Consideration should be given to acquire this additional right of way on the westerly side of existing US 95. Lots facing US 95 should be about 95 feet deep, giving a potential right of way width up to 175 feet. This width would be adequate to accommodate all cross-section elements. Shifting the viaduct alignment westerly would also eliminate the dog-leg shown on exhibits for the Northwest Boulevard interchange.

It is difficult to visualize this as a cost-effective way to remove 5-8% of the traffic volume from Lincoln Way.



IRONWOOD AREA VIADUCT

Scale: 20:1



IRONWOOD AREA VIADUCT

Scale: 20:1

ANALYSIS ITEM B:
Comparison of maintenance issues -- Huetter Alternative Route vs. US – 95 Expressway.

The basic premise of constructing a new facility on the Huetter corridor implies that maintenance concerns would be identified and provided for in the design phase. The major maintenance consideration would be the effect of additional lanes miles added to the system above what ever is decided for US 95, and the effect of the need to maintain two separated facilities with no corresponding increase in maintenance resources, personnel or equipment.

Constructing a US 95 Expressway facility within the existing 220-foot wide right of way would necessitate compromises on many issues. For example, the depressed roadway section would require fitting the drainage facilities to utilize any available unpaved surface, pumping where necessary to remove stormwater from the depressed US 95 section up to the available roadside. Extensive use of retaining walls would be necessary to prevent a "rollercoaster" profile.

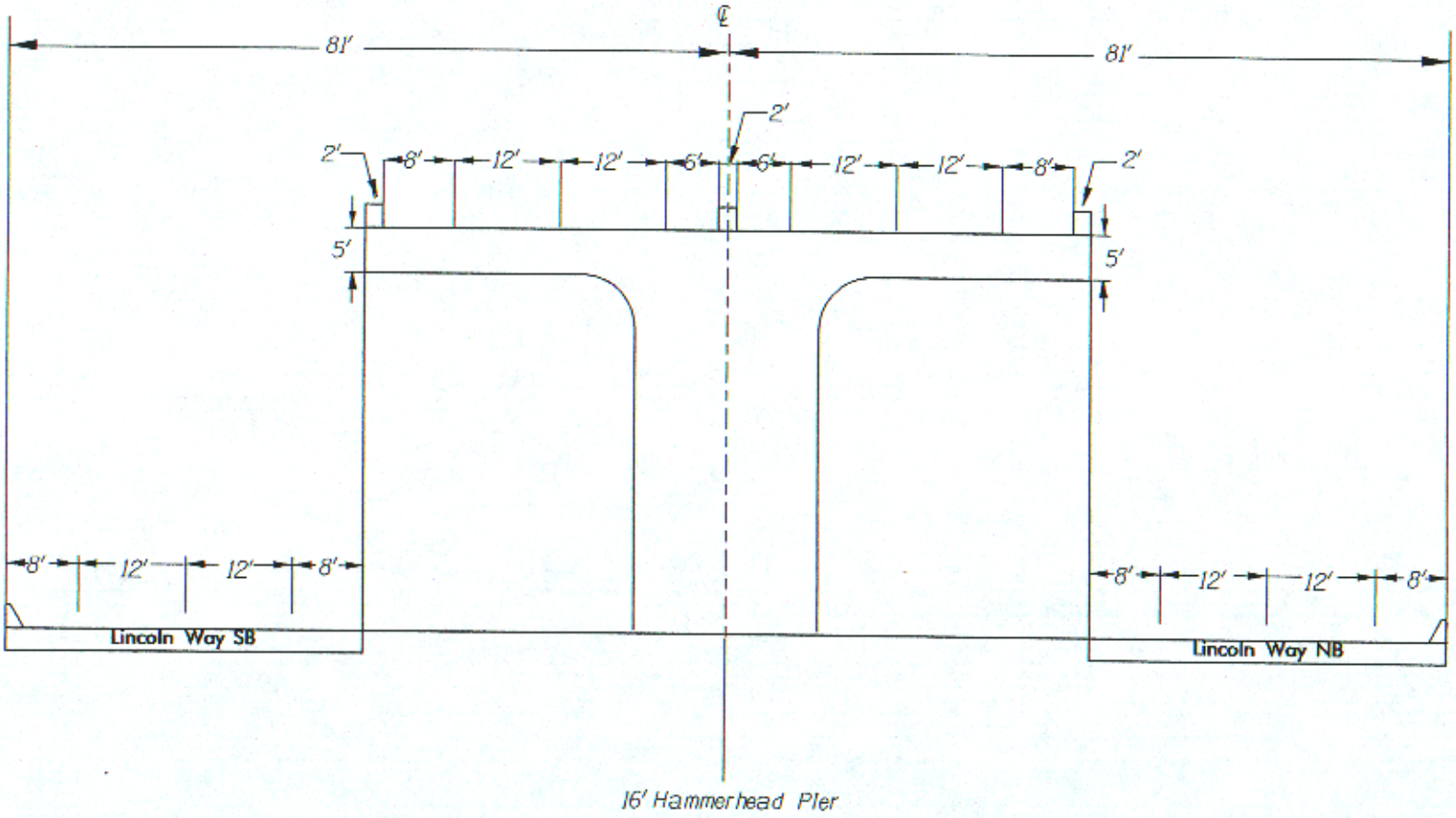
Routing of snow control equipment would be more complex for the Expressway Alternative with its array of frontage roads, slip ramps, and interchange structures. The Huetter corridor would be a simple, at-grade, rural 4-lane divided section with conventional interchange configurations. With US 95 in it's present configuration included, there would be about 25 percent fewer lane miles to maintain than for the US-95 Expressway Alternative.

A state-local maintenance agreement for snow removal on the US 95 Expressway frontage roads and / or on the Huetter frontage road should be explored. The City of Coeur d'Alene has an established priority to have snow removed from arterials within 4 to 6 hours of the end of a storm. This would be difficult for ITD to accomplish without additional resources. Highway Districts and Cities usually begin a concerted effort to put all resources into service on one shift following a storm. They have major roadways cleared before ITD would be able to clear the State highways and the frontage roads.

Reconstruction of US 95 on the present alignment would require the consideration of sound walls at as many as nine residential areas. Planning and design of the Huetter Alternative to eliminate or minimize the need for walls would provide an opportunity to coordinate predicted noise levels with land use restrictions through Kootenai County planning and zoning requirements.

Air quality problems associated with the depressed US-95 Expressway would require more frequent and complete brooming and flushing to control sanding material dust. Airflow across the Huetter at-grade roadway would minimize any dust problems.

Anti-skid material is presently available at the District One Headquarters Yard, at the 40 Acres maintenance yard on Ramsey Road in Coeur d'Alene, and at the Meyer Road stockpile in Rathdrum. If the Huetter Road extension to State Highway 53 would be constructed, there would be all weather accessibility to these stockpiles via the Huetter Road extension to SH 53, via the improved Prairie Avenue and I-90.



EXPRESSWAY VIADUCT
OPTION B

Scale: 20:1

Identify favorite option:

Short Term Improvements:

1. Alternative 4b. Curve realignment and new t-intersection at Walnut Ave. This work has been needed since the late 1960's. The improvement would remove an unconventional right angle turn for US 95 combined with two City street intersections. Property along US 95 could be acquired with this stage to accommodate the US 95 leg of the ultimate grade separation interchange
2. Alternative 3a, Flyover Ramps from west I-90 to north US 95. Objective would be to remove southbound US 95 to westbound I-90 traffic from the congestion at the Appleway / US 95 intersection.

Long Term Improvements:

1. Huetter Expressway.
   "if they build it the cars will come". It is difficult to say that in the long term, the existing US 95 corridor will continue to be the commercial strip of choice. Looking at growth in other areas of the country, commercial developments gravitate to ready access. There is admittedly a large commercial investment in the existing corridor, but in 20 years?? -- Who can predict. The Huetter corridor should be locked up as much as possible now. This could include coordination with Kootenai County P & Z on noise and land use restrictions.
2. US 95 Expressway with Diamond Interchanges.
   Trying to do everything (frontage roads and interchanges) within the existing 220 foot right of way would require many design and operational compromises. If US 95 is dedicated as a transportation corridor and not an access facility, improvements would have to be made to the local street system -- spreading traffic demand beyond one facility.

   Right now, there is a significant trafficvolume using the diamond interchanges at Lincoln Way and at 4th Street to access the local system. The US 95 expressway interchanges could function in the same way -- accommodating access to the major cross roads, with intermediate circulation on the local system.
3. Harrison realignment w/ connection to Northwest Blvd.

   Coeur d'Alene suffers from a lack of continuity and options in its east-west street system. This connection would provide needed continuity on Harrison Ave from Northwest Blvd to 15th Street. It could result in the northbound traffic rerouting from the congestion on US 95 to use Northwest Blvd and Ramsey Road.

The local road system would require capacity upgrades to support any US 95 expressway alternative. The existing road system connecting to the Huetter corridor would not have structural capacity nor traffic volume capacity adequate for the traffic expected to use the Huetter Alternative. To provide an adequate connecting road system would require significant expenditures consistent with the Kootenai County Area Transportation Plan for Long-Term Improvements Master Plan 2017, Figure 4.1. Without structural and capacity improvements to the local system, a heavy maintenance burden would be placed on the local agencies. Narrow, structurally inadequate roads that are already subject to extended seasonal periods of load restrictions would not handle the ESALs generated by increased truck traffic accessing the Huetter Alternative.

APPENDIX

For

US 95 STUDY

- Maintenance Study Goals
- Design Standards for US 95 Expressway
- Maintenance Design Vehicle
- U-turn radius for Alternative 4
- ITD Winter Maintenance Standards
- Memo to Area Maintenance Foremen

Bob's To Do List
12/19/01

After review of materials provided by Sverdrup and exhibits from December 19 open house, prepare report addressing the following topics.

A. Provide written critique of the following planning level concepts from a maintenance perspective. Include any suggestions for modifying concepts to facilitate maintenance and operations. Identify any fatal flaws that are apparent now at the planning level. (It's understood that more detailed design later may reveal problems that you won't be able to see now – we're just looking for the big picture stuff now.)

1. US95 Improvements north of I90:
    a. Expressway with frontage roads, overcrossings and slip ramps.
    b. Expressway with diamond interchanges and no frontage roads.
    c. Expressway with roundabout interchanges and frontage roads.
    d. Expressway with single point urban interchanges and frontage roads.

2. Huetter Alternate Route north of I90, including interchanges at I90, Hanley, Prairie, Hayden, and Lancaster; grade separations at all other local roads; and use of existing Huetter road as frontage road. Also discuss issues related to depressing the Alternate Route near the airport.

3. I90 Interchange improvements:
    a. Fly over ramps from west I90 to north US95 (35 mph and 45 mph options)
    b. Partial cloverleaf interchange

4. 20-year US95 Improvements from Ironwood to Northwest Boulevard:
    a. Four lanes with center raised median and channelized left turns at Emma and Mill, with highway overcrossing at LaCross.
    b. Curve realignment and new T-intersection at Walnut.
    c. NW Boulevard ramp reconfiguration to right-in-right-out on US95.
    d. Passenger car u-turn accommodation between Ironwood and Walnut.

5. Staged long-term US95 improvements at Walnut:
    a. Grade-separation (partial "interchange") at Walnut and US95.
    b. Harrison realignment w/ connection to NW Blvd; full diamond interchange with US95.
    c. Ultimate viaduct concept from I90 to Spokane River.

B. Compare maintenance issues of adding a new Alternate Route to the state system vs. developing existing US95 as an expressway. Provide written summary.

C. Identify your favorite option (or set of options) at this stage, and discuss your reasons. (Reasons don't need to be limited to maintenance issues.)

Carole Richardson

From: Carole Richardson
Sent: Tuesday, November 06, 2001 3:44 PM
To: Jeff Simmons (E-mail)
Cc: Andy Mortensen (E-mail); Jason Minzghor; Marvin Fenn; Michael Porcelli; John Blumenkamp (E-mail)
Subject: Design Standards for US95 "Expressway"

Hi Jeff,

I'm going to send you excerpts from our Design manual via snail mail -- too much paper to put through the fax.

Sending you Chapter 6 -- Design Guidelines and Standards; and Appendix C -- Design Criterial for Specific Projects. You'll find we're a little lacking in urban design standards. For example, minimum lane widths on urban highways are not given.

Suggest the following for the expressway unless AASHTO is more stringent:

Lane width	12 ft
Shy to median barrier	6 ft
Shoulder width	12 feet (as much as possible for snow storage)

Suggest we try to accommodate the following on the frontage road couplet:

Lane width	12 ft
Curb and gutter	
Shy to curb	2 ft
Multi-use pathway	10 ft

Depending on couplet speeds, maybe curbing and small strip of vegetated area will provide enough protection for the pathway users(?) We'll probably need a recommendation from you guys on this.

If the rest of the information you need isn't spelled out specifically in the excerpts I'm sending, please refer to the AASHTO green book.

Also, if you need to access our design standards in the future, you can download them from this link. It can be a little tricky to navigate through our website -- if you have trouble, Holly McClure in our Boise Roadway Design office can send you a CD with all our design manuals on it. She can be reached at (208) 334-8486.

http://www2.state.id.us/itd/design/downloads/R&S%20Downloads/R&Sdownloads.htm

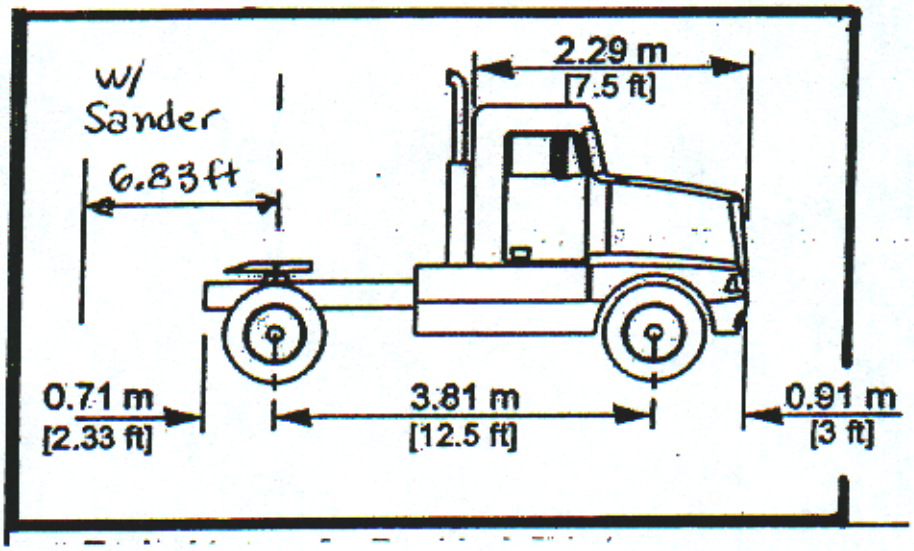
Good luck,

Carole

55 mph
17' vert clear

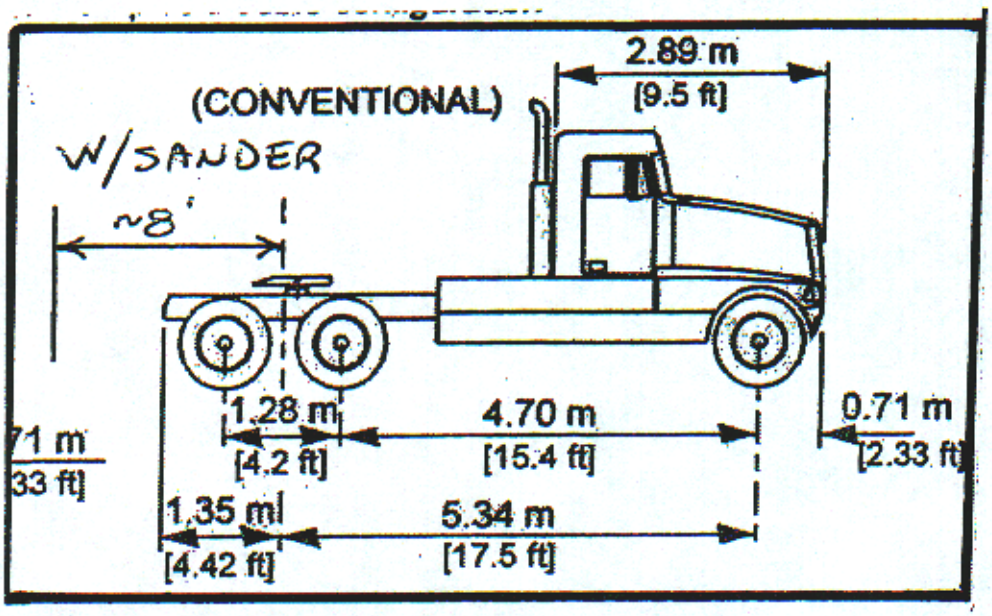
DESIGN MAINTENANCE VEHICLES

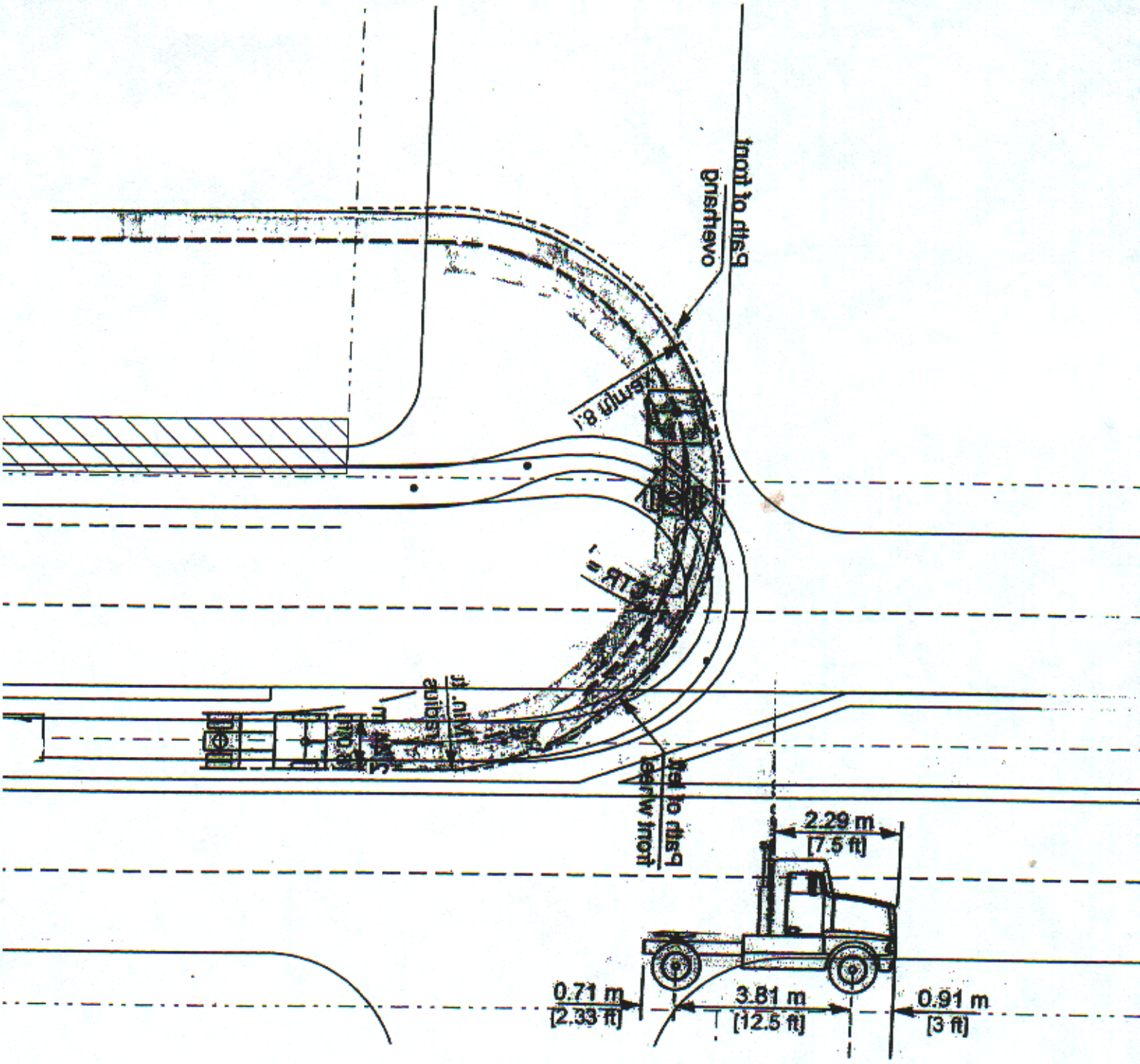
From AASHTO –Geometric Design of Highways and Streets
Page 30



SINGLE AXLE MAINTENANCE VEHICLE 33,000 GVW

TANDEM AXLE MAINTENANCE VEHICLE, 54,000 GVW





MINIMUM TURNING RADIUS
FOR
SINGLE AXLE MAINTENANCE TRUCK

Based on Exhibit 2-13, AASHTO Geometric Design of highways and Streets.
Intermediate Semitrailer [WB-40] Tractor Unit

Figure 330.0-B
WINTER MAINTENANCE STANDARDS DEFINITIONS

The map identifies levels of winter maintenance service approved by the Idaho Transportation Board for those routes on the State Highway System not covered by a separate city or county maintenance agreement.

Plowing and sanding activities will be accomplished as follows:

LEVEL 1 (YELLOW)	Remove snow continually during storms to keep the roads open to traffic and provide a reasonable surface on which to operate, except when blizzard, avalanche, or other severe forms of weather make conditions such that maintenance and motor vehicle operators cannot reasonably negotiate the travelway. Keep at least one lane in each direction open during the storm. Clear the remaining lanes and shoulders after the storm ends. Patrols may be established in areas where surveillance is desirable. When effective, apply chemicals or abrasives, separately or in combination, to enhance traffic safety. Continue efforts until a trafficable condition exists.
LEVEL 2 (RED)	Remove snow during storm to keep roads open to traffic, except when blizzard, avalanche, or other severe forms of weather make conditions such that maintenance and motor vehicle operators cannot reasonably negotiate the travelway. Snowpack left by plows need not be removed until thawing conditions exist, or the pack becomes so thick as to constitute a traffic hazard when it thaws. Remove the pack and widen the travelway during regularly scheduled working hours, except that overtime may be authorized by the District Engineer if he determines it to be economically feasible. Patrols may be established in areas where conditions make surveillance desirable. When effective, apply chemicals or abrasives, separately or in combination, to enhance traffic safety on steep grades, sharp curves, bridge decks and approaches, intersections, known high accident locations, etc.
LEVEL 3 (GREEN)	When manpower and equipment are available, remove snow during the storm to keep the roads open to traffic, except when blizzard, avalanche, or other severe forms of weather make conditions such that maintenance and motor vehicle operators cannot reasonably negotiate the travelway. Additional snow removal shall be accomplished during regular working hours. Generally, chemicals and abrasives are not used, but may be applied at specific locations under unique or extraordinary circumstances. These routes may be posted to indicate limited maintenance.
LEVEL 4 (LIGHT BLUE)	Remove snow during the storm only when manpower and equipment are not being utilized to clear other routes. These routes may be closed for an extended period of time until resources are available to plow the travelway. Winter maintenance shall be accomplished during regularly scheduled working hours on these routes. Chemicals and/or abrasives are not used; if surface condition becomes too hazardous for traffic to reasonably negotiate, the section should be closed. When temporary closures are required, signing, notification of authorities, etc., are accomplished in accordance with the Maintenance Manual. These routes will be posted to indicate limited maintenance.
LEVEL 5 (BLUE)	Low volume state highways maintained during the winter at a level uniform with adjacent local jurisdiction roads.
LEVEL 6 (GREEN/ WHITE STRIPE)	These routes shall be maintained at a Level 3 standard until the first danger of avalanche exists. At the on-set of avalanche danger, the road segment shall be closed and remain closed until all danger of avalanches has ended.

Prior to winter maintenance operations, every effort should be made to assure that equipment is in top operating condition. Extra care should be taken to insure that all safety equipment is in proper working order.

Idaho transportation department

Memo

To: John Waisannen – 160 Foreman Area
Greg Munden – 170 Foreman Area

From: Bob Ewing

CC:

Date: 1/28/02

Re: EVALUATION OF NEW US 95 IMPACTS ON MAINTENANCE FORCES

I have been asked to evaluate the impacts several alternatives for the reconstruction / relocation of US 95 might have on maintenance forces, equipment and funding.

Part of that assignment is to identify critical maintenance activities that would be affected, i.e., drainage in a depressed highway section. Then to determine what the impacts would be and how they might be mitigated in design or in providing additional maintenance resources to deal with the impacts.

The attached spreadsheet has some of the maintenance areas I feel would be impacted. For now, I need your comments on what problems to consider in those areas, and to list any additional concerns you feel should be addressed. Then we can plug those concerns into the specific alternatives being considered. **If it works into your schedule to get back to me by Friday, 2/01/02, it would be appreciated.**

The consultant was assigned to develop "corridor" alternatives for use in planning for highway growth and management for the next 20+ years. The scope has expanded to the point that what I would call design alternatives are being developed. For example, consideration of what type of interchange should be used –diamond, roundabout, etc. This means that the analysis of maintenance concerns needs to be more detailed.

The study includes one option to construct a new highway facility on the Huetter Road corridor. This would include interchanges and full control of access from the abutting properties. This is your opportunity to provide input on what problems would be expected – drifting snow, what ever else????, and then a recommendation would be included in my report for a solution to the problem. Or, if the problem is severe enough, we might recommend the alternative should be removed from any further consideration.

NOTE

February 1, 2002: Interviewed Greg Munden and John Waisannen, ITD maintenance foremen for the areas encompassed by this study.

The purpose of this interview was to discuss the maintenance concerns identified previously, and to determine if there were additional items to be considered.

The items identified on page 8, Maintenance Issues were agreed upon as the most relevant maintenance concerns for this study.